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GENERAL INFORMATION

# CHEMICALS

The management magazine of the industry



*Starting this month:*

New series on how  
the manufacturer can  
help his dealers

*Production methods:*

Exclusive report on  
making fertilizer grade  
potassium nitrate

*Special reports:*

W. R. Grace develops  
"non-burning" fertilizer

California ag pilots  
talk safety, taxes

"Stu" Bear reports on

## How Niagara reorganized for profits

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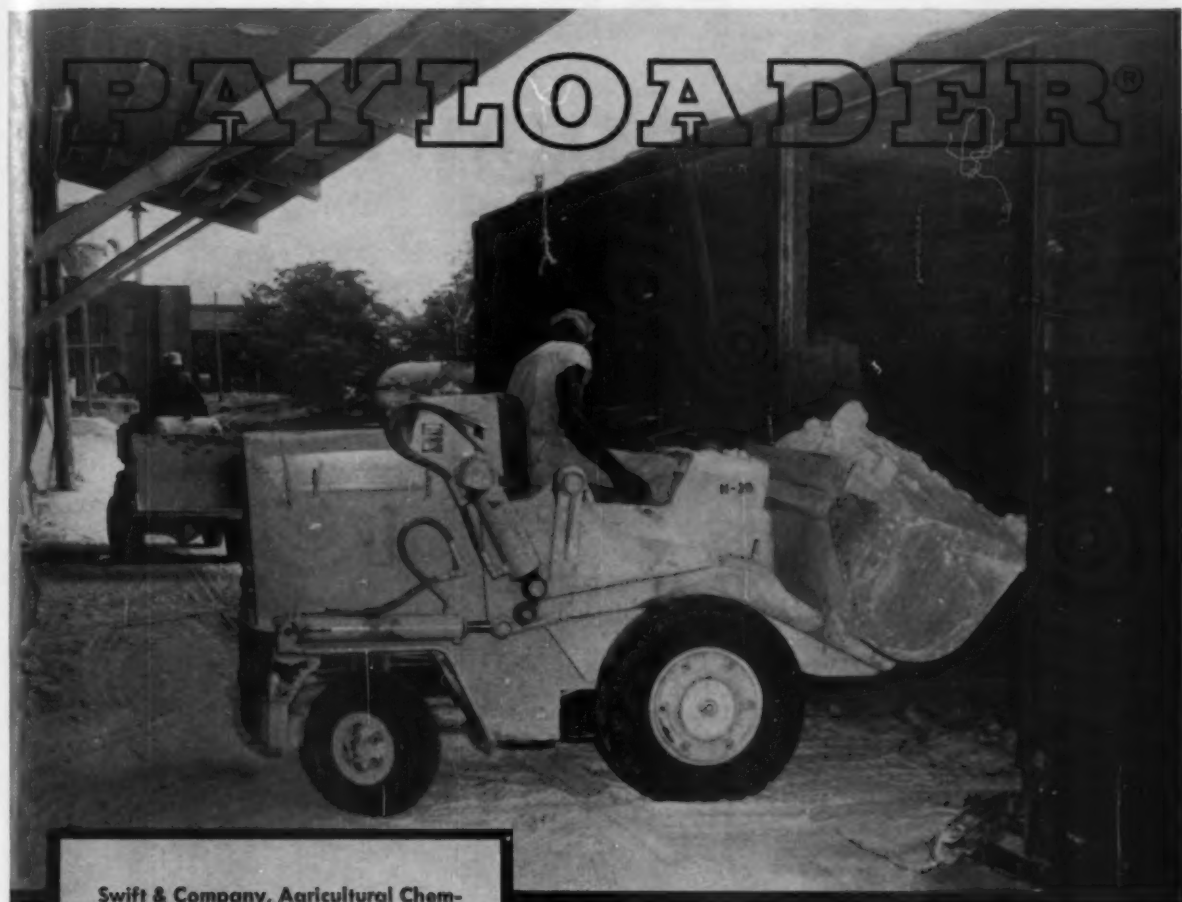
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LIBERTYVILLE, ILLINOIS  
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#### MEMBER BUSINESS PUBLICATIONS AUDIT

The national business magazine for the fertilizer and pesticide industries, **FARM CHEMICALS**, serves primarily those persons responsible for management, marketing and production. It has a qualified circulation for selected executive and supervisory persons within specified segments of these industries, as well as in certain closely allied fields. Subscription rates to all others are: in the U.S., its possessions, Canada, Cuba and Panama: \$6.00; in other countries: \$7.50. Current issue 50 cents. Back issues \$1.00. (Current issues become back copies on the 5th of the month following publication.) Established in 1894 as *The American Fertilizer*.

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### THE COVER PICTURE

Not the least of the accomplishments of "Stu" Bear, manager, Niagara Chemical Div., Food Machinery & Chemical Corp., is the fact that he's a graduate of the executive program in business administration of Columbia University. He did this after some 20 years of successful practice in business—not to learn theory, but to advance his own thinking and to share his rich experiences with other like-minded business executives. He rose from salesman and divisional manager to one of America's great companies doing close to half a billion dollars worth of business. In this month's marketing feature he outlines the policies behind Niagara's reorganization in January, 1958.





The home of Bumpero brand pelletized mixed fertilizers is this large plant at South Omaha, Nebraska. This modern manufacturing facility of Farm Fertilizers, Inc., serves customers in Nebraska, Iowa and Kansas.

Richard E. Bennett  
President  
Farm Fertilizers, Inc.



## Pace-Setting Midwest Fertilizer Manufacturer Relies On SPENSOL GREEN\* Solutions:

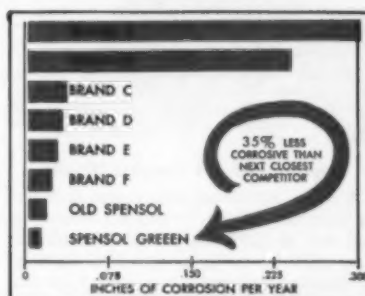
A pace-setter in their area, Farm Fertilizers, Inc. of South Omaha, Nebraska, has introduced several manufacturing "firsts" to the Midwest's fertilizer industry. In 1950, two years after beginning production, this progressive firm became one of the first plants to granulate in the Midwest. More recently, they led others in utilizing pre-neutralization to produce high-analysis, inverted ratios.

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Compare for yourself above—laboratory tests prove that SPENSOL GREEN cuts corrosion costs by at least 35%. It will pay you to make your next order genuine SPENSOL GREEN!

Insist on



# SPENSOL GREEN

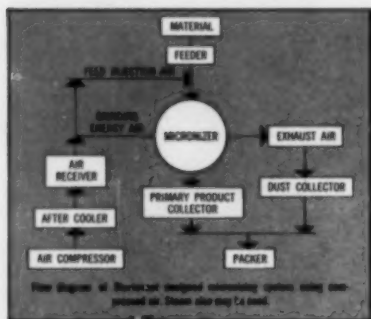
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**Sturtevant Micronizers\*  
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**One Operation  
Reduces, Classifies**

Sturtevant Micronizers grind and classify in one operation in a single chamber—provide fines in range from 1/2 to 44 microns to meet today's increased product fineness needs. Can handle heat-sensitive materials.

*Production Model  
(15 in. chamber)*

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Particles in high speed rotation, propelled by compressed air entering shallow chamber at angles to periphery, grind each other by violent impact. Design gives instant accessibility, easy cleaning. No moving parts.

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Centrifugal force keeps oversize material in grinding zone, cyclone action in central section of chamber classifies and collects fines for bagging. Rate of feed and pressure control particle size.

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## LETTERS

### "SAFE USE" AID

Baltimore 3, Maryland  
We thought you might possibly be interested in an effort we are making to aid the National Agricultural Chemicals Association's "Safe Use" program through the use of "reminder" stickers such as the ones at the top of this page.

(The yellow stickers, measuring 2 inches x 1 1/2 inches, are reminders to "Use Pesticides Properly—Follow Label Directions"—Ed.)

As you know, this program—which is largely an educational one—was set in motion by the recent FDA studies of the toxic effects of some agricultural chemicals on foods which resulted in some inaccurate and adverse publicity for our industry. We are happy to report that, seemingly, the NAC program is being received well, evidenced by the fact that we have received many requests for our stickers and have distributed more than 10,000 of them since their introduction last June.

Anyone who wants to use these stickers can obtain them free of charge (in reasonable quantities, of course) by simply writing to this office or any of our district offices. They are large enough to be easily read, yet small enough to be applied to letters and invoices as well as to product packages.

Yours very truly,  
G. D. BAERMAN  
Manager, Insecticides Dept.  
Chemicals Division  
OLIN MATHIESON  
CHEMICAL CORP.

Lawrence, Kan.

We would like to have the FARM CHEMICALS magazine sent to our sales personnel. We believe that this publication is the best in its coverage of agricultural chemicals selling and marketing.

Yours,  
MARSHALL MCGLAMERY  
Vice-President  
AGRICULTURAL BUSINESS  
CO., INC.

El Monte, Calif.

We are interested in the article, "New Substance for Control of Plant Diseases" on page 53 of the December, 1960, issue of FARM CHEMICALS and will appreciate your advising how we can obtain information on "Pisatin."

Yours very truly,  
K. C. MATTSON  
K. C. MATTSON CO.

Discovery of "Pisatin" was reported at the International Symposium on the Chemistry of National Products by Dr. D. R. Perrin, W. Bottomley and I. A. M. Cruickshank. They are with the Commonwealth Scientific and Industrial Research Organization, 314 Albert Street, East Melbourne C-2, Vic., Australia. —Ed.

### INTEREST IN SALES SERIES

Birmingham, Ala.

I have been following, with much interest and enthusiasm, the series of very interesting articles by O. C. Merrett in the Marketing Division of FARM CHEMICALS, and want to compliment you on making this material available.

In my opinion, many of the books and articles on the subject of successful selling go too much into the theory and do not seem to be able to get down to earth, recognizing that after all, salesmen and purchasing agents are human beings (despite rumors to the contrary) and therefore have the same human frailties as men in any other profession.

In any event . . . I would like to know if reprints of these various articles are available—and if so, what the cost involved would be in purchasing these for distribution to our own sales personnel.

Again, you are certainly doing a very splendid job with FARM CHEMICALS.

DAVID W. LYNCH  
General Sales Manager  
VULCAN ASSOCIATED  
CONTAINER COMPANIES  
INC.

Remington, Ind.

I have read with much interest the article entitled "Research Progress in Missouri and Its Importance to the Fertilizer Industry" by C. M. Woodruff in the December 1960 issue of FARM CHEMICALS.

I would like to have one hundred reprints of this article if they are available. I find that information of this kind is very valuable to our salesmen and dealers in helping their customers plan their fertility programs.

Very truly yours,  
WAYNE W. SILVEY  
District Sales Manager  
Fertilizer Division  
VIRGINIA-CAROLINA  
CHEMICAL CORP.

Lubbock, Tex.

The writer has been very much interested and active in seeing the consignment of agricultural chemicals ended. Consignment is without a doubt the industry's number one problem.

I believe we had very good results in West Texas in only one year of trial and error. I sincerely believe that if the results of our efforts were publicized it would add strength to the cause. With this in mind I have put down the facts as I see them and would appreciate your publishing them in your magazine. I am sure the article will need editing as I lay no claim to being an author.

Thank you for your consideration of this matter.

Yours truly,  
W. R. WOOD  
President  
WOOD CHEMICAL CO.

Thank you for your letter and facts about your program, Mr. Wood. For the benefit of our readers, we'd like to "sum up" your experiences: The Wood Chemical Co. considered that it was 75 per cent effective in eliminating consignment. This is a pretty good batting average for the first season! With this start and the confidence they have developed between competitors, they feel they should reach the 100 per cent goal in 1961. We certainly wish you a lot of luck!—EDITOR.

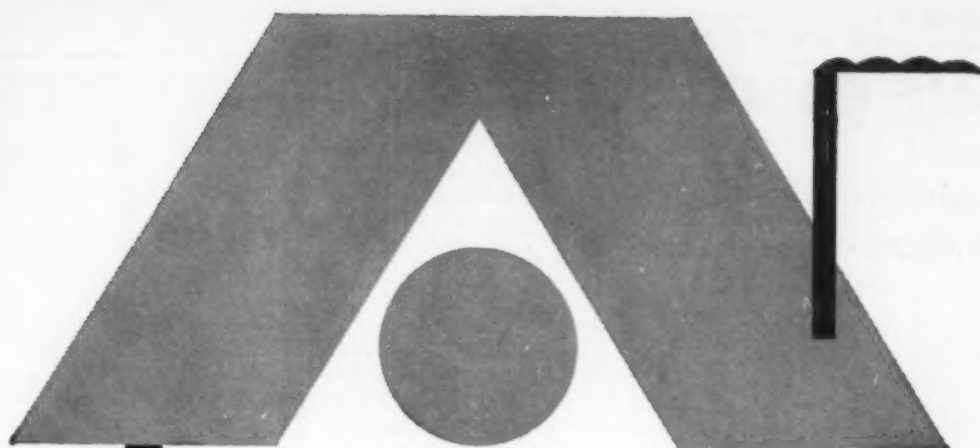
### IOWA SOIL INSECTICIDE USAGE RISES 67 PER CENT; BOOSTS CORN CROP

Iowa farmers applied soil insecticides to 67 per cent more corn land during the 1960 crop season than they did during 1959, Iowa State University Entomologist Harold Gunderson says.

He estimated that increased usage of soil insecticides was responsible for at least 54 million more bushels of corn.

Last year, 3,572,600 acres of corn land was treated with one-half pound of aldrin or heptachlor per acre in the row at planting time. In 1959 only 1,836,470 acres received the row treatment. And 1,148,000 acres received a 1-pound per acre broadcast application of aldrin or heptachlor ahead of planting in 1960—compared with 711,910 acres during 1959.

FARM CHEMICALS



## A \$60,000,000 STEP IN ARMOUR'S PROGRAM OF PROGRESS

As America's need for more and better fertilizers grows, Armour Agricultural Chemical Company continues to improve its products and expand its facilities. The latest example of Armour's progressive philosophy is its new \$60,000,000 program for increasing its nitrogen and phosphate production facilities. By 1962, new installations will approximately TRIPLE Armour's production of these materials. A nitrogen plant will be built near Sheffield, Alabama, and a phosphate plant near Fort Meade, Florida. In addition, facilities for manufacturing mixed fertilizers will be expanded and modernized.

New installations larger facilities and ever-improving technical methods have made Armour the most respected name in the fertilizer industry: a name synonymous with quality and dependability. The Armour Program of Progress is devoted to improving the products and services that have made the Armour "A" a symbol of quality in the fertilizer industry . . . the "BIG A" in agriculture.



**31**  
**SALES OFFICES**  
**SERVING THE**  
**FERTILIZER**  
**INDUSTRY**

**ARMOUR AGRICULTURAL CHEMICAL COMPANY**  
General Offices, Atlanta, Georgia



# WASHINGTON VIEWPOINT

F  
C

- *Changes in tax laws could turn out to be the big story of the year*
- *Kennedy Administration committed to raising farm income—by hook or by crook*

Changes in tax laws are coming under the Kennedy Administration—considerable number this year and even more later. Because the changes will affect you as a businessman and as a private citizen—no matter what your walk of life—we are devoting much of this month's report to the tax outlook and the kind of changes the new government leadership will work toward. This could turn out to be the big story of the year.

The Kennedy advisers are very definite on the direction they want to go and on many changes that they believe are necessary to juice up the economy—and they are convinced that juiced-up it must be. The main play-back we get from talking with the new tax men is that they plan to avoid playing favorites with anyone on how income is to be taxed. They see income as income regardless of from what source it is derived—with a very few exceptions. They believe this is the answer to a broader tax base, more revenue for the government, lower tax rates, and allowance for bigger government spending—all at the same time.

No big omnibus tax revision law is expected to be sought by Kennedy. The plan is to pick at the law bit by bit until the whole thing is switched around to suit the new experts. This has the added advantage of not arousing a lot of taxpayers with different interests all at the same time. This, they believe, is to be avoided at all costs for it would very surely solidify congressional opposition and increase probability of no changes whatever.

One thing the new Administration wants, by way of over-all authority, is approval for the President to manipulate tax rates within specified limits according to economic conditions. That is, it wants to be able to raise rates slightly to control booms, and lower them a bit to reverse recessions.

Flexibility also would be sought on treatment of plant and equipment investments. This would mean that companies would be permitted to cut their tax bill by a certain percentage of plant and equipment they buy over and above the depreciation they take. The percentage would vary from time to time according to the state of the national economy.

Kennedy will shoot at the "loopholes"—and will press for swift action in first few months. For example, take dividends. He'd repeal the 4% credit and the \$50 exclusion. A substitute relief method would be provided under which stockholders would report as income both dividends and tax that the company paid on them, then cut their tax by the amount of tax that was paid by the company. This would mean that stockholders below company's tax bracket would gain, and those over it would lose by the change.

He would impose a withholding tax on dividends and interest at the same time. Also, remove the present exemption on state and local bond interest—taxes would be paid on those. In addition, the tax on savings and loans associations would be increased, which would mean lower dividends.

On long-term capital gains, this is the Kennedy strategy: Increase the 25% top rate, and extend the holding period beyond six months. Allowance for capital losses would be increased. Later on, further tightening would be sought: Tax unrealized capital gains at death, and take away the relief from such things as employee stock options, sales of depreciable assets by businesses, and lump sum payments from pension and profit-sharing trusts and patents.

All this is what the Kennedy experts want to do first, and Washington opinion is that Congress will give the President much of it—although probably not all. Still, it is difficult at this time to pin-point just what Congress would buy and what it would not. Following are some of the Kennedy long-range tax aims of interest:

A tax would be imposed on social security benefits, also on employee fringe benefits such as company-paid medical and life insurance, sick pay and so on. Credit on retirement income for old folks would be stopped, as well as the extra personal exemption for people over 65 years of age.

(Continued on page 10)





## 41 plants...for prompt delivery of AA quality products

41 plants of The A.A.C. Co., located in the United States, Cuba and Canada, assure you dependable, fast deliveries of AA quality products for farm and industry. You can schedule your production with confidence... the right quantity and grade will be at your plant when you need it.

*for uniform quality, prompt delivery  
and technical service... order from*

The  
**American  
Agricultural  
Chemical**  
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### producers of:

Florida Pebble Phosphate Rock • Superphosphate  
AA® QUALITY Ground Phosphate Rock  
All grades of Complete Fertilizers • Keystone® Gelatin  
Bone Products • Fluosilicates • Ammonium Carbonate  
Sulphuric Acid • Phosphoric Acid and Phosphates  
Phosphorus and Compounds of Phosphorus



GENERAL OFFICE: 100 Church Street, New York 7, N.Y.

FEBRUARY, 1961

## WASHINGTON VIEWPOINT

**Some important deductions now allowed would be ended**, on individual income tax returns, such as: State sales and excise taxes, property taxes would be deductible only up to a specified limit, interest (except if incurred during the course of business) also would be deductible only up to a certain point. The standard individual deduction of 10 percent would be lowered, perhaps down to 5 percent. The reasoning behind the cut in individual deduction is that the standard deduction should be less if fewer things are deductible.

**On the liberalizing side**, some form of income averaging would be developed. The idea would be to allow taxpayers to spread out capital gains and other income over, say three years, in order to minimize the tax bite on persons with sharply fluctuating incomes.

Nothing on depletion allowances is expected soon, because of Kennedy assurances given during the election campaign. This is a very hot item and the Kennedy crowd will give it long study—and let it go at that, *for a while*.

**If all this sounds tough**, here's something that will clear up any

doubt: Tax enforcement will be tightened up considerably—on top of it all. The new men want to hire more revenue agents and check many more income tax returns. Not only more checking, but more explaining in detail will be required—particularly of businessmen.

So—there it is. The "new frontier" on taxes.

### **Now, what about the farm situation?**

One thing the chemical industry should keep in mind: The Kennedy Administration is committing to raising farm income—by hook or by crook. This is its avowed goal, and it is all that the Kennedy people, including the new Secretary of Agriculture, Orville Freeman, talk about.

How will this be done? Can't tell for sure at this early stage. Background of the new Secretary is that he has campaigned hard on tight production controls and increases in price supports. His tutor on this is Dr. Willard Cochrane, the tight control economist from the University of Minnesota. BUT—in talking with Freeman and men around him, we find that he's not as sold on the tight control approach now as he was before his appointment. Matter of fact, we doubt seriously whether he has any deep-down convictions on just what ought to be done

about the farm surplus and low-income problems. This may be good, if he gets good advice, or, of course, it could turn out bad. Have to wait and see.

This, however, seems certain: Few major changes in farm programs will be made for the 1961 production season. There will be some increases in price supports, and there may be some slight tightening of controls—but we do not expect anything drastic this year. Farmers generally will operate under the same government programs this year as they did last year.

Again, the thing to bear in mind is that Kennedy is more interested in boosting farm income than in cracking down on production. Neat trick if he can do it.

**The big ace-in-the-hole** the Kennedy people think they have is the food-for-peace program. This was started under Eisenhower, but mostly got nothing but lip-service. The Kennedy people want to blow this program into grand proportions. Instead of just trying to get rid of surplus commodities abroad for the sake of cutting down the government's investment, the new leaders want to tie farm production into foreign policy. That is, they plan to go to the various needy countries, find out what they need, and then come back and ask the U.S. farmer to produce it.

## You Get "WIDE SPREAD" Performance with **BAUGHMAN'S TWIN DISTRIBUTOR K-5**



### **LIME and FERTILIZER SPREADER**

World's most efficient spreader body . . . K-5 absolutely guarantees you better trouble-free, money-saving performance for your investment! With this experience-engineered spreader, you can ACCURATELY REGULATE THE NUMBER OF POUNDS SPREAD per acre and BE SURE OF UNIFORM DISTRIBUTION. K-5 features:

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- Lower maintenance cost . . . thanks to the most rugged spreader body ever built.
- Lube-impregnated chain drive, a Baughman exclusive, that positively insures greater corrosion resistance and virtually eliminates chain "freezing."
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Better Service Through Better Engineering.

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# SYMBOLS OF PLANT LIFE



**B**ecause of the complete ignorance of the masses during the Dark Ages, alchemists, with their knowledge of chemistry, were presumed to be in league with the devil. In experimenting with potash, they were forced to resort to signs and symbols. If

they didn't . . . the result could be death!

Today, potash means life . . . life to promote food and fiber growth for an ever-growing population.

Southwest Potash Corporation provides a dependable supply of HIGH-K muriate for the plant food industry.



*Distillation During 16th Century*

**SOUTHWEST POTASH  
CORPORATION**

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*\*A commonly used 15th Century Symbol for Potash*



# WHAT'S DOING IN THE INDUSTRY

## FEDERAL CHEM. STOCKHOLDERS OK NAT'L. DISTILLERS MERGER

Stockholders of Federal Chemical Co. have voted nearly 97 per cent of the outstanding stock in favor of a merger with National Distillers and Chemical Corp.

For the Federal stock, National Distillers and Chemical will exchange a total of about 250,000 of its common shares at the approximate rate of eight National shares for each share of Federal common and about  $4\frac{1}{4}$  National common shares for each Federal preferred share.

Roy F. Coppedge, Jr., president of National, said that Federal Chemical will be operated under its present name and by its present management and operating personnel as a division of National Distillers and Chemical Corp. Jefferson D. Stewart, Jr. is Federal Chemical president.

## SOLAR NITROGEN CONTRACTS FOR NEW UREA PLANT

Contract for construction of the first urea unit of its kind in the United States at the Joplin, Mo., facility of Solar Nitrogen Chemicals, Inc., has just been let to Arthur G. McKee & Co., Cleveland, Ohio. The announcement was made by Ralph K. Gottshall, president and chairman of the board of Atlas Powder Co., and Charles E. Spahr, president of The Standard Oil Co. (Ohio), whose companies share equal ownership of Solar.

Construction of the urea unit, to cost between two and three million dollars, was expected to start this month, with completion in October.

Solar's ammonia unit, now being built by M. W. Kellogg Co., is to be completed in April.

Atlas will operate the Joplin facility,

and Sohio Chemical Co., which is both manufacturing and sales agent for Solar's Lima, Ohio, facility will market the Joplin plant's products.

Edward F. Morrill, vice president of The Standard Oil Co. (Ohio) is president of both Solar and Sohio Chemical. Edward J. Goett, executive vice president of Atlas, is vice president of Solar.

## PENNSALT, NUTRILITE TO MAKE BIOLOGICAL INSECTICIDES

Nutrilit Products, Inc., and Pennsalt Chemicals Corp. are completing details for a joint effort in manufacturing and marketing biological insect control products.

Nutrilit has received notice of registration from USDA for Biotrol, a biological insecticide containing *Bacillus thuringiensis*, Berliner, as its active ingredient. Registration also has been granted by the State of California. At present, Biotrol has been registered for control of imported cabbageworm, cabbage looper, artichoke plume moth and tobacco hornworm on broccoli, cabbage, cauliflower, celery, lettuce, potatoes, artichoke and tobacco.

## SOUTHWESTERN AGROCHEMICAL BUYS KERLEY ASSETS

Acquisition of the assets of Kerley Chemical Corp. of Arizona by Southwestern Agrochemical Corp., Chandler, Ariz., and merger of the two organizations has been announced by Duncan A. Sim, general manager of Southwestern, and R. V. Kerley, president of Kerley Chemical.

Effectuated January 1, the merger reportedly will give Southwestern sales of about \$5½ million annually. Sim will continue as general manager, and Kerley becomes sales manager.

## ARMOUR AWARDS CONTRACTS FOR N, P<sub>2</sub>O<sub>5</sub> PLANTS

Contracts for construction and services to implement Armour Agricultural Chemical Co.'s \$60 million expansion program have been awarded, according to William Wood Prince, president of Armour and Co., parent firm.

Contracts cover a nitrogen plant in Colbert County near Cherokee, Ala., and a phosphate plant in Polk County, Fla. To be completed in 1962, the plants will approximately triple Armour's present production of nitrogen and concentrated phosphate materials.

M. W. Kellogg Co. was awarded the contract as engineering manager of the nitrogen plant. They will construct an ammonia plant with capacity of 360 tons daily, a urea plant of 50 tons daily capacity and off-site facilities including plant offices and other services buildings.

Chemical Construction Corp. will build an ammonium phosphates plant in Alabama.

Chemical and Industrial Corp. contracted to build the nitric acid plant, nitrogen solutions plant and ammonium nitrate plant in Alabama. Daily capacity will be 240 tons of nitrogen solutions and 250 tons of ammonium nitrate prills.

Rust Engineering Co. won the engineering management contract for the Polk County phosphate plant and will also construct the office and service facilities.

Chemical Construction Corp. will build the phosphoric acid and triple superphosphate plants in Polk County.

Titlestad Corp. was awarded the contract to produce two sulfuric acid plants for the Polk County facility.

## DEMAND FOR SULFUR SET RECORD IN 1960

Sulfur had a good year in 1960. Domestic consumption and exports were at record levels, and important additions to productive capacity were made.

Charles A. Wight, president of Freeport Sulphur Co., in an annual review of the industry pointed out that preliminary data indicates domestic consumption of sulfur was greater than the previous high of 5,950,000 long tons used in 1959. Consumption in 1959 was 11 per cent over 1958. The phosphate fertilizer industry, which had a record year, was a particularly strong factor in the sulfur market, Wight said.

Exports of sulfur from the U. S. have been estimated to total 1,700,000 tons last year, up 100,000 tons over 1959.

Domestic sulfur production was up about 7 per cent, Wight said.

## Meeting Highlights

### THIS MONTH

### 13th Annual Joint Meeting of Midwestern Agronomists and Fertilizer Industry Representatives

Edgewater Beach Hotel, Chicago, Ill.

Sponsored by the National Plant Food Institute's Midwest regional office. February 16-17. The first day's program will open at 1:00 p.m., with a welcome by Paul T. Truitt, NPFI president, and Zenas H. Beers, Midwest regional director.

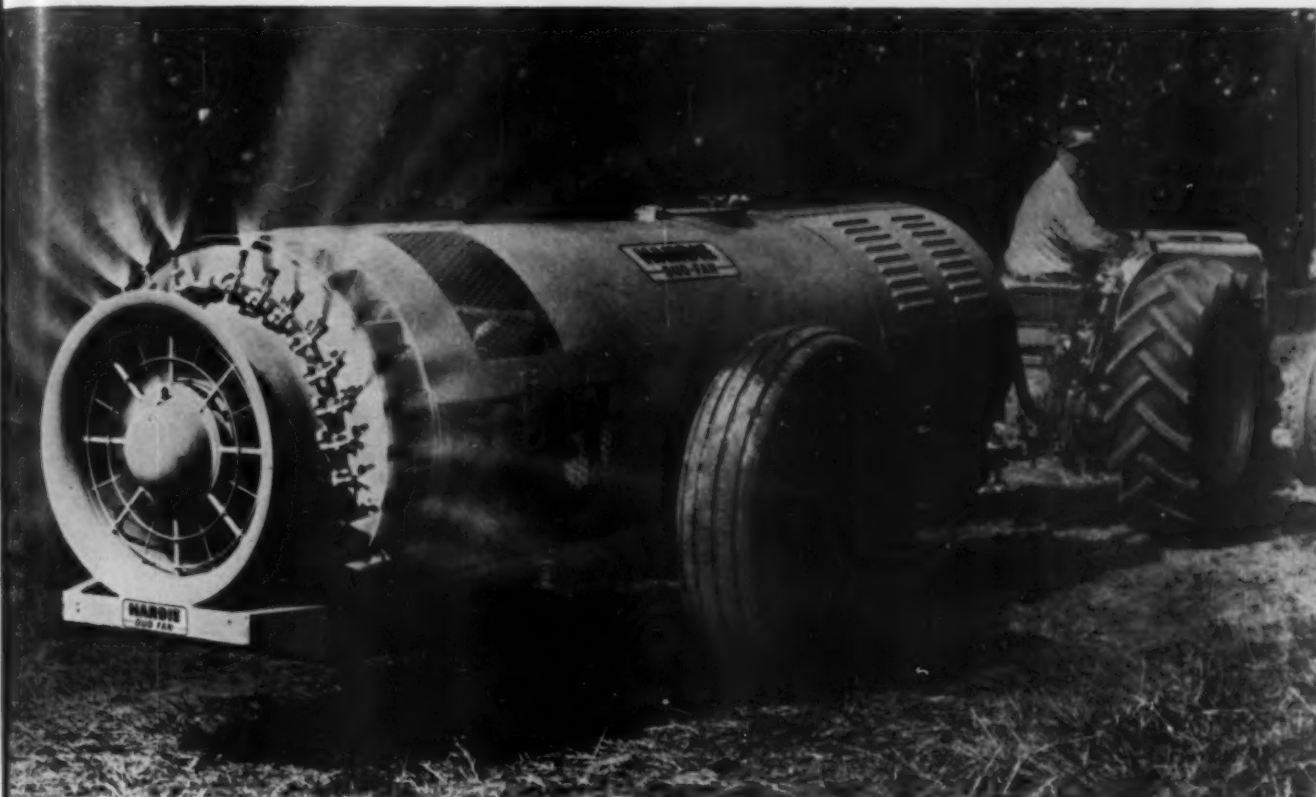
The program will feature (1) A report on the role of the Extension Service and its relationship to the fertilizer industry; (2) A discussion of the bankers role in credit for fertilizer; (3) A review of the Miami County, Ohio, demonstration program and its effects on fertilizer use; (4) Fertilizer research reports by agronomists from Iowa, Kansas, Ohio and Wisconsin; (5) Analysis of a Wisconsin study on the impact of improved management practices in boosting farm income on different types of soils.

Dr. M. B. Russell, head of the University of Illinois agronomy department, is chairman of the meeting. Dr. R. L. Cook, head of Michigan State University soil science department, is co-chairman.

Speakers include Dr. D. G. Aldrich, University of California; Douglas R. Graves, Harris Trust & Savings Bank; Dr. Everett Rogers and Dr. Gordon Ryder, Ohio State University; Dr. Marvin Beatty, University of Wisconsin.



# FARM CHEMICAL TANKS SHOULD BE MADE OF **Ingersoll** STAINLESS-CLAD STEEL



*Hardie Duo-Fan Air Blast orchard sprayer with tank made of IngAclad Stainless-clad Steel*

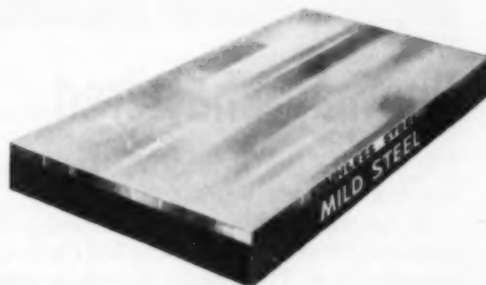
**WHY?** *Because highly corrosive farm chemicals cannot attack the stainless steel lining made of Ingersoll IngAclad stainless-clad steel*

## HERE ARE THE FACTS:

1. IngAclad stainless-clad steel is priced approximately 28% less than solid stainless steel.
2. Stainless-clad steel tanks outlast ordinary steel tanks by many, many years.
3. 20% of the total sheet thickness is Ingersoll stainless steel.
4. The stainless layer is type 304 (18-8) Stainless.
5. Leading sprayer manufacturers are now specifying IngAclad steel for their chemical sprayer tanks.

*(Ingersoll is the only manufacturer of single-clad stainless-clad steel sheets.)*

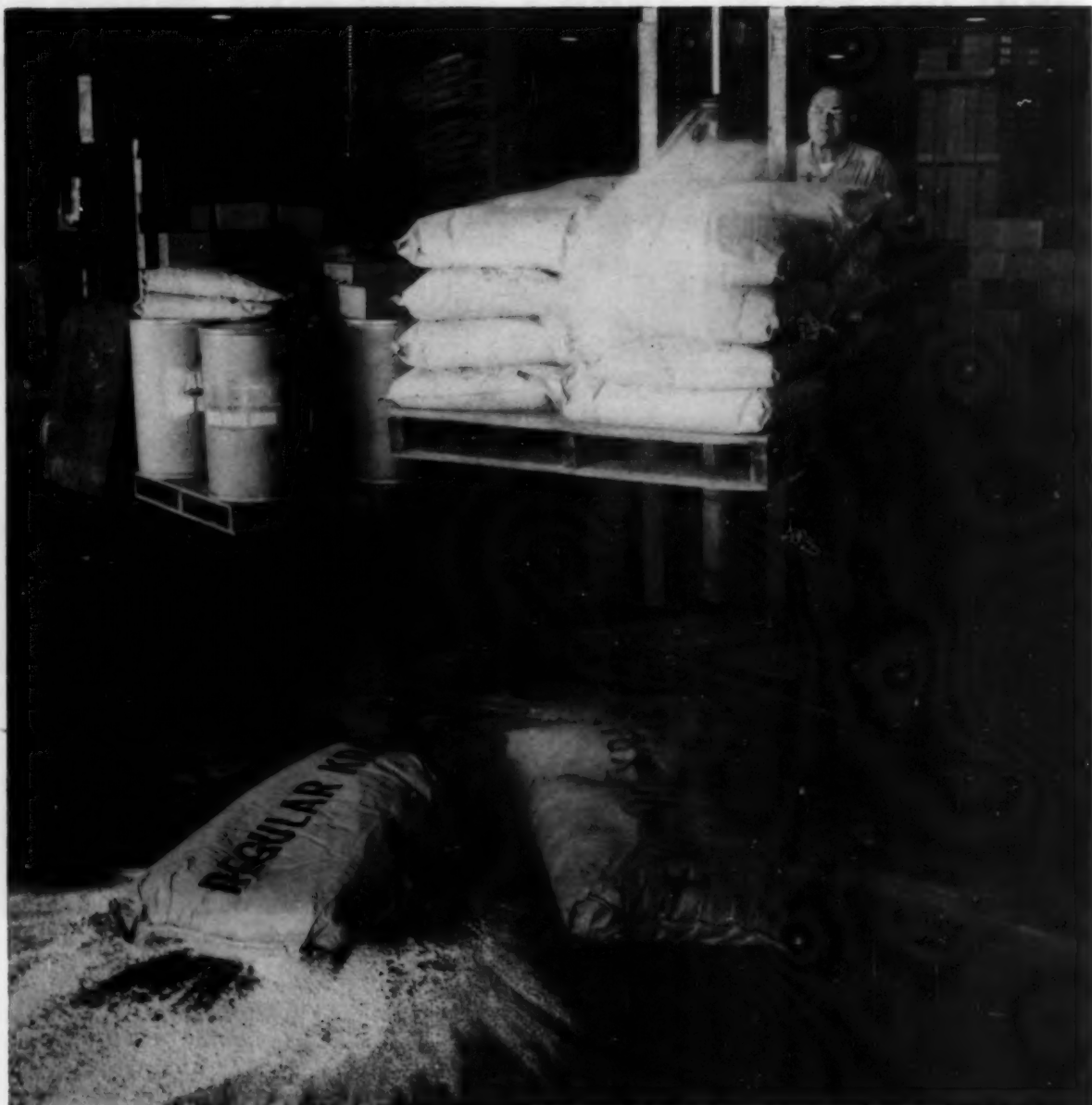
*Send for a Free Sample of IngAclad Steel and a copy of our new Facilities and Products Brochure.*



**Ingersoll STEEL DIVISION**  
**Borg-Warner Corporation**

NEW CASTLE • INDIANA





## One bag shattered . . . the other has two-way stretch


The *unbroken* bag is made of H&W's new high-strength Expanda-Kraft.

As the lift truck braked to a sudden stop, both bags flew through the air and fell hard against the concrete floor. The regular kraft bag split open — note the spilled flour. Yet, look closely at Expanda-Kraft. *Not a sign of breakage!* Naturally, both bags were identical in basis weight and number of plies.

Expanda-Kraft is stronger, because it's made by a special roll-crepe process. It's resilient, has two-way stretch that soaks up shock. Available in white, semi-bleached and natural.

Expanda-Kraft comes in 40, 50, 60, 70, 80 and 100-pound basis weights. *For samples and information,* write Hollingsworth & Whitney, Division of Scott Paper Company, Chester, Pennsylvania.

# EXPANDA-KRAFT

**HOLLINGSWORTH & WHITNEY** DIVISION OF  
 **SCOTT PAPER COMPANY**

# NEW PUBLISHERS for Farm Chemicals

**E**FFECTIVE with this issue, we welcome FARM CHEMICALS into the family of farm magazines published by American Fruit Grower Publishing Co. These include AMERICAN FRUIT GROWER, AMERICAN VEGETABLE GROWER, and COUNTY AGENT & VO-AG TEACHER, as well as FARM CHEMICALS HANDBOOK, the annual directory of the industry.

FARM CHEMICALS has a record of 66 years of service and is the first magazine in the field. As the new publishers, we will extend and strengthen FARM CHEMICALS' value to the expanding pesticide and fertilizer industry.

Gordon L. Berg will continue as editor. His experience and excellence, along with a greatly expanded editorial staff, will accelerate FARM CHEMICALS' editorial program of marketing, production and finance which has made this publication the most important to the industry. You, our readers, will notice changes in the months ahead designed to produce a more vital and helpful magazine.

A bigger, better magazine is the aim which led to the purchase of FARM CHEMICALS. The joining of FARM CHEMICALS with a leading farm publishing group and its knowledge and background with fertilizers and pesticides will inevitably produce a stronger publication. We feel that this move will further increase our service to the pesticide and fertilizer companies which have been served through the years by AMERICAN FRUIT GROWER and AMERICAN VEGETABLE GROWER.

Rod Zilenziger has been appointed Eastern Advertising Manager in an expanded New York office. Al Zilenziger will head the enlarged Chicago office as Midwestern Advertising Manager.

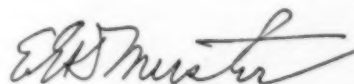
These two offices, in addition, will handle AMERICAN FRUIT GROWER, AMERICAN VEGETABLE GROWER, and COUNTY AGENT & VO-AG TEACHER.

A word about you new publishers. President Edward L. Meister, Jr., graduated from Yale University and with over 20 years experience in farm publishing, is a recognized leader in agriculture publishing. Richard Meister, vice-president and general manager, graduated from the College of Agriculture at Cornell University and the Harvard Business School, and has guided the highly successful editorial policies of AMERICAN FRUIT GROWER and AMERICAN VEGETABLE GROWER.

AMERICAN FRUIT GROWER is one of the nation's oldest farm publications, published since 1890. It is a magazine for the commercial fruit industry, with a circulation of 130,000. AMERICAN VEGETABLE GROWER is the leading magazine for commercial vegetable growers and packers, with a national circulation of 60,000. COUNTY AGENT & VO-AG TEACHER is the number one magazine in the agricultural leader field, with a distribution of 37,000 copies nationally.

As in the past, it will be the aim of FARM CHEMICALS to speak fearlessly without bias on all questions affecting the welfare of the farm chemicals industry. The history of this country shows the importance of influential magazines which have supported the work of organizations and leaders who have unselfishly advanced the interest of their industry.

To our readers and advertisers we pledge our best efforts in the coming years.



PUBLISHER

# How Niagara Reorganized for PROFIT

Here is the Niagara success story. With its reorganization in 1958, the

Division's return on investment improved "several-fold"; profits were multiplied and sales volume increased. "Stu" Bear explains how the marketing concept was put to work—and profitability replaced volume as a standard of performance.

By STUART BEAR

**W**HEN I refer to Niagara's experience in policy formulation, I'm referring to part of a system and regulatory measures set up when the division was re-organized on January 1, 1958—and some of those that were set up since.

I will relate some of the problems we encountered when the policies were instituted and will comment in some cases about our successes and our failures. Some policy formulation problems arise dealing with people up the organization ladder, as well as down.

**Identifying Niagara Chemical Division, markets and product lines**—Niagara is one of five chemical divisions of Food Machinery & Chemical Corporation. The Chemicals Division Management group governing the five chemical divisions consists of chief executives; two operating department heads, inorganic and organic, and the usual staff departments—such as traffic, purchasing, advertising, accounting, public relations, central engineering, central research, central development, marketing, industrial relations, legal, patent and so on.

Headquarters, as well as division headquarters for the other chemical divisions, are in New York City. Niagara Division headquarters are 400 miles northwest of New York City in a village of 1,600 people—Middleport, N. Y.

The scope of our operation shows twelve producing plants spread over the United States. We sell in the fifty states and have Canadian and Mexican subsidiaries. My discussion here will be limited to domestic business.

## 12 "PROFIT CENTERS"

The organization chart of January 1, 1958 showed a highly decentralized structure with four operating departments. While we had fourteen regions in the agricultural department, there were seven regional geographical sub-divisions of the agricultural department.

Each is a profit center with separate profit and loss and asset statements. The manager of each operating depart-

ment and each sub-division or region in the agricultural division is held accountable for profits and return on investments.

On January 1, 1958 there were twelve profit centers in the domestic division with seven regions, four operating departments—with the division itself being a profit center.

In addition, staff departments for research—these were thin staff departments—development, credit, industrial relations, advertising, public relations, accounting, traffic and so on, were set up to serve the entire division.

We do use the chemical division's staff departments to some extent; in legal and patent work, we use them exclusively. We do not have such staff departments within the division.

## WHAT TOOK PLACE BEFORE 1958

Now for contrast, let's take a look at the "picture" before 1958. This was a centralized structure with only the top man responsible for profits and asset control. There was no responsibility accounting except for the division as a whole. Most department heads had line responsibility extending through the organization.

For example, all plant superintendents reported to the production manager. The sales manager alone set prices, terms and directed the advertising. Approval for price changes, establishing warehouses, consigning goods, special package sizes and so on was vested in the sales manager alone.

Technical service to sales was a part of the research development department, which reported directly to the division head. The credit management function was under the controller and the credit manager—in this case a forceful individual who had developed an autocratic position amounting to almost a veto power over sales activities.

## NOW . . . FOUR BASIC PRODUCT GROUPS

Returning now to the 1958 reorganization, the product line, which ranges all the way from ounce bottles and one pound cannisters for the home owner to basic pesticide

*Stuart Bear is general manager, Niagara Chemical Division, Food Machinery and Chemical Corporation.*



chemicals, was divided for marketing into *four basic groups*—Fairfield Chemicals, Agricultural Chemicals, Technical Chemicals and Retail Products.

Fairfield Chemicals' product line is based largely on non-crop pesticides.

The Agricultural Product line consists mostly of finished pesticides for commercial agriculture, insecticides, fungicides, miticides, soil fumigants, soil stimulants and growth response chemicals. Much of this product line is formulated from basic pesticide chemicals purchased outside the corporation. This department represents the largest segment of our business.

Formulations registered with the USDA are about 1,600 in number today and many are packed in two, three or more package sizes for agricultural apothecary shops.

Sales are made to growers, dealers, distributors, other formulators, state and federal agencies and so on. Distribution is from the producing plants and the hundreds of warehouse and consignment points in the consuming areas of the United States.

The Technical Chemicals Department product line consists of a limited number of new basic pesticide chemicals and a few industrial products. Sales of the basic pesticide chemicals are made to other members of the industry, local and national formulators, who produce their own brand name formulations of these materials.

The Retail Department product line consisted of a group of small package pesticides for use around the home and a patent-protected rodenticide for home, farm and industrial use. Sales were made only to distributors except if brokers participated in the sale of the rodenticide.

So much for the organization, product line and market.

Policy formulation in a decentralized division, which is one of the number of divisions in a corporation, may be pretty well stated, if we used the often repeated phrase, "that which is not reserved by top management or expressly forbidden is permissible."

At Niagara, we naturally subscribe to certain corporate policies applicable to all divisions. Some of these measures deal with industrial relations, functions such as labor relations, union negotiations, upper echelon conferences, retirement provisions, fringe benefits for employees and so on.

In financial areas such as capital investments, accounting methods where our reports must be slotted to fit corporate pegs, illegal activities and patent matters, we follow the corporate policy.

#### **DETERMINE NEEDS OF FARMER FIRST**

At the division level, those regulatory measures are made that affect marketing and our products in the broad sense.

We first make efforts to determine the needs of our customers. If the customer is a cotton farmer—what does he need, for example, to grow more cotton of better quality at lower cost.

Our sales contacts, technical familiarity with agricultural practices, marketing research, will guide the emphasis on research effort directed toward benefits for the cotton farmer.

How much of the total research effort shall be devoted to making new chemicals that do a little better job than those now on the market—and how much should be of a more basic nature that might constitute a break-through of some sort?

For example, the sterilization of insects by radiation, which may not involve the use of chemicals at all. We decide this at the division level. We decide at the division level that production is under control of the manager responsible for marketing.

Production requirements are developed from sales estimates. Return on investment minimums are established at

the division level. Opportunities for profit and levels of return on investment vary widely within the several segments of our business.

In some segments, patent protection and favorable basic economic conditions do not exist. Competition, as some of you know, is keen. Profit margins are extremely low. Turnover, therefore, must be proportionately higher and an extremely tight control of inventories and receivables investments is mandatory.

In other segments, the reverse situation exists. Profit margins encourage adequate inventories for maximum sales—as well as longer terms if they contribute sales volume. Product grouping for marketing purposes is our decision to make at the division level.

Should the new products from our research and development effort be handled exclusively by our agricultural department? Should those basic chemicals in the technical chemical department product line be transferred to other departments in the divisions and preferential prices in relation to values used for other members of the industry? Should our Fairfield and Technical Chemicals Departments be combined?

We must decide!

An active program of management development is one of our division policies. Attendance at management development schools and functional seminars is encouraged. Sales training, recruiting plans and public relations are in the minds of all of us all the while.

Now at the Operating Department or profit center levels, policies are made that govern sales effort, technical service, product line within the pesticide field, package price, condition of sales, distribution system, advertising, promotion, procurement, production and staffing.

These managers also have a voice in the amount of research effort expended in their interests. If the Operating Departments want to add products to their line, they may do so without conferring with the division management. In procurement, they have the services of the central purchasing department available to them, but may buy at their advantage from vendors having no arrangement with our central purchasing department.

In prices, terms and conditions of sale freedom to move exists—except that consideration must be given to certain federal regulations and fair traded items and so on.

They may utilize distribution channels of their choice, but these may vary within a given department. In general, policy formulation has been relegated as far down the organization ladder as we feel is practical.

#### **HOW WE SET PERFORMANCE STANDARDS**

How do we set and measure standards of performance, particularly for and above the operating profit centers? I'm referring now to the regions in the agricultural department, as well as the department as a whole and the other departments.

Goals for each operating center are set by the manager himself. What does he want to do? What share of the market does he want? What share does he have now? Which portion of his business is most profitable? Which part is the easiest to expand? How well is his product line suited to the market potential? What additional products are needed? Can he get them? How do his ambitions compare with industry growth?

Jack Brennan, my associate of many years and the ex-president of NAC, says that we're growing at the rate of 5 per cent a year. Now when a man comes in that's projecting a growth in sales and profits next year of 3 per cent, he doesn't have very high ambitions!

Plans to achieve these goals are then made by the man-

### *How Niagara Reorganized for PROFIT (continued)*

ager. These may have involved expanded production facilities, substantial development effort to secure support of tax paid influence people who exercise some control over the buying decisions and so on.

To elaborate on this point, ours is a unique business in the sense that the so-called influence group—the extension services, college people and all of the other individuals and groups of individuals who influence the buying decisions on the part of our customers in pesticides—is unique! It certainly isn't true in any other industry that I know of.

But the manager's plans, his goal, may have involved added sales personnel, a modification of the distributor system, advertising, sales promotion and so on. In making the plans and organizing for the job, policies and procedures are re-examined at the department and regional profit center levels.

Are prices, terms and other conditions of sale adequate? Will, for example, the credit policies serve the objective?

The goals and the plans to achieve them and the review of policies and procedures when reduced to statistical form, is recognized as a *budget*. This is reviewed with top management group in the division.

#### **BUDGET SERVES AS A YARDSTICK**

Profits, investment in plants, inventories and receivables and return on investment is forecast. The budget then serves as a statistical yardstick by which we measure performance. It is not the only yardstick. Some of the others would read like this:

How fast did the manager react and change course from his plan when confronted with an unanticipated and uncontrollable event?

For example, crop disasters occurred in a few territories. Goods and inventory were convertible for use elsewhere. Were they converted and were sales powers shifted rapidly to dispose of the inventory?

How is the morale in this profit center? Is there enthusiasm and team spirit? How many customer complaints came to your attention and how were they handled? Are there discussions about new ways to increase asset turnover? Is the man thinking all the while about the future? What progress can be reported in personnel development, increase in sales efficiency and introduction of new and more profitable products and finally—I think this is very important—does he get a big bang out of his job?

So much for policy making at the different department levels in the division.

**Regulatory measures**—Our experience in the introduction and execution of this system of regulatory measures over the past three years was not without problems and errors.

A major problem was to convert sales-oriented supervisors into managers and I use the latter term in its broadest sense. Now this is supposed to revolve around the district sales manager. Most of our men were district sales managers in their earlier capacities. Also, remember that most of these men were trained in the biological sciences. They were not graduates of the Harvard Business School.

Most of them didn't know what return on investment meant. Nearly all of them came up through sales but some from research and production. Most of them could not read a P and L statement. With such a background, unusual agility is required to jump from a sales job to a manager's job with all that the latter title implies.

These managers are responsible for profit and asset control, as I said, and have authority to make decisions in all matters except a few corporate and divisional policy items.

The indoctrination was intense and it continues to be in-

tense. Incentive compensation plans for salesmen were modified to motivate asset control as well as sales in more profitable lines. Incentive compensation plans were developed to motivate department and regional managers to increase profits and operate their business at satisfactory or rising levels of return on investment. There was some resistance to these changes.

#### **OBJECTIVE "CHANGES COURSE"**

Our division's objective changed course somewhat in these three years from January 1, 1958 to the present. Our first job at the beginning was to raise the return on investment to a level that was necessary to keep capital interested. This is the polite way of saying we didn't want to go out of business.

Motivation, education and communication were heavily oriented in this direction in the first two years. A satisfactory raise was achieved in the first year, but fearing that this could have been an accident due to natural factors rather than management control, the pressure continued through the second year.

The second year's return was higher than an optimum conducive to maximum profits. The third year we wanted to change emphasis from raising return levels to expanding sales volume and profits by reaching further into the market and taking more low margin business. And perhaps expanding inventories and receivables were helpful even though the rate of return declined.

We succeeded only partially. Communications were inadequate. Sales budgets which were already in preparation when this decision was made did not wholly reflect the management change in emphasis. The result was still higher return and somewhat less sales and profits that could have been attained. I am using this as an illustration of an error in communications on my own part—failure in communications.

Another problem dealt with staff personnel comprehension of their new duties. Keep in mind that some of these men had spent half or most of their lifetime in the old centralized organization. For example, I told you that the credit manager in the old organization almost completely dominated sales. He limited credit lines. He could order deliveries stopped for lack of credit information or until the customer paid . . . You could say he was "cruel." He dealt directly with salesmen and their supervisors. His record in the bad debt loss area was very good. *It was too good!*

In the new organization, this individual continues as the division credit manager. His duties are different. He reviews credit requests of major numbers only and serves management in this respect by alerting us to major potential losses.

His principal function is to make good credit managers out of salesmen in the information gathering activity—and to teach managers of operating units the fundamentals and correct use of the two as an effect on return, sales volume, profits, customer relations, capital requirements and so on.

The outstanding capability of this individual is helpful in making a complete transition from one job to another—even though he sits at the same desk.

#### **ANOTHER PROBLEM—RETAIL**

Another of our problems was in the retail department. This department's product line, you will recall, consisted of an old line of small package general purpose insecticides and new rodenticides of outstanding efficiency packed in a patented container used as a feeding station when open.

Sales were not developing and the department was losing money. The elements for success in marketing consumer goods of this kind were not known to any of our management personnel when the decision was made to go into this kind of business. When the elements for success were studied

(Continued on page 22)

**VELSICOL**

# INSECTICIDE OUTLOOK for 1961:

plans, promotions, and favorable trends indicate  
expanded sales opportunities for formulators!



## HEPTACHLOR

### *...growing demand!*

Extensive tests conducted by leading experiment stations prove that Heptachlor can't be beat for effectiveness in control of soil insects. Demand for Heptachlor continues to grow. In 1961, you will see more intensive advertising to capture even more sales. Besides major regional and state media, Heptachlor will be promoted in hundreds of local newspapers and billboards.



## ENDRIN

### *...branching out!*

Endrin is relatively new, in terms of uses and acceptance. 1960 saw the development of many new Endrin markets. Apples, potatoes, cotton and many other crops were widely treated with Endrin during the past year. The use of Endrin-Methyl Parathion mixtures for cotton insect control proved especially popular and effective. In 1961, you can anticipate a big Endrin demand in all markets, helped along by strong promotional programs keyed to local requirements.



## CHLORDANE

### *...better than ever!*

If they held popularity contests for insecticides, Chlordane would win the gold cup every year. Lawn and garden use has risen sharply as Chlordane has become established in crabgrass control. Chlordane is preferred because of its unmatched safety and performance record. 1961 promotional plans call for greatly increased local advertising, more national advertising, sales promotion and educational materials, and many other innovations.



**WATCH FOR MORE DETAILS ON VELSICOL INSECTICIDE SALES SUPPORT PROGRAMS!**



**VELSICOL CHEMICAL CORPORATION**

**330 East Grand Avenue, Chicago 11, Ill.**

Velsicol International Corporation, C. A., P. O. Box 1687—Nassau, Bahamas, B.W.I.



# What the **MANUFACTURER** can do for the **DEALER**



## PART I

### *The Market Talks*

By F. E. HARTZLER

**B**EFORE we begin talking about the things manufacturers can do for dealers, we had better begin by showing why the manufacturer really needs dealers. And perhaps in an industry as new as this one it would be wise to define the general terms so that there will be no confusion.

#### DEFINITION OF TERMS

*Supplier*—For the purpose of this article a supplier will be the basic raw materials supplier.

*Manufacturer*—This will be firm or person whose primary goal is the supplying of a product to retailers. His primary job is not sales to farmers.

*Distributor*—This is essentially a wholesaler and as such is not too important in this industry.

*Dealer*—This is a firm whose primary concern lies in sales to the farmer. There is a lot of confusion in this area, in that some people who are merely mixing ingredients think of themselves as manufacturers. Since they only mix ingredients, they are manufacturers only in the sense that a druggist, a baker or a restaurant cook is a manufacturer. In a far more accurate sense they, too, are dealers.

#### CHARACTERISTICS OF THE PRODUCT

The characteristics of the product, to a certain extent, determine the type of marketing arrangement that is essential to move it. The product has about seven basic characteristics.

- 1) It is heavy and is moved by the tons.
- 2) It is bulky and not in solid form such as pig iron.
- 3) It must be protected from the elements.
- 4) It is a complex substance in use—not simple like sand or gravel.
- 5) Local conditions affect the optimum use.
- 6) It is sold to a small proportion of the population. Thus, it does not require heavy foot traffic past the place of business.
- 7) It is not the sort of product that the farmer can put in a shopping bag to take home.

As a result of these characteristics we could expect that the product would have to be shipped in large amounts, probably from a firm located near an available rail head or highway; that it would require considerable local storage; and that it would require a local dealer of some ability and repute to handle the product. Furthermore, the location would be in a low rent area, and would not require a large city. As a matter of fact, a large city might only deter customers.

This, then, is the pattern within which the manufacturer will have to operate. It is the sort of pattern that requires a local dealer. The heavy delivery costs tend to keep delivery at a minimum, the salesman cannot very well carry enough with him to sell direct, and the product is so seasonal that delivery dates also require a local outlet.

#### THE MARKET SITUATION

Now usually we distinguish three marketing periods. They look better in the books than they do in reality, but this does give us a frame in which to think.

*Pioneering*—In the pioneering market the manufacturer has a tremendous advantage. He has a product and since there are not too many in the market he can command a good margin and get it. This is time for missionary work, for the good old hard sell, and with all a nice profit for the man with nerve enough to gamble. Here the advertising is usually bold and vigorous because it has to be. Those dealers who get in early will find a fine profit in spite of the inefficiency that is inherent in any new endeavor.

*Competitive*—This is the type of market that develops after a fair amount of acceptance of the product has been reached. This is primarily a price market until the people begin to sort themselves out. It is a time when business efficiency becomes of paramount importance, because survival depends upon merchandising.

This period is marked by business failures, particularly by those who came in early strictly on a gamble. In the competitive market gambling is dangerous. There is a tendency now for efficiency to be more important than innovation.

*Established*—This is the third phase of marketing. The firms that have emerged from the competitive marketing period consolidate their gains, usually reaching some sort of gentleman's agreement about territories and such things. These agreements are really in the marketing pattern rather than in love and kisses.

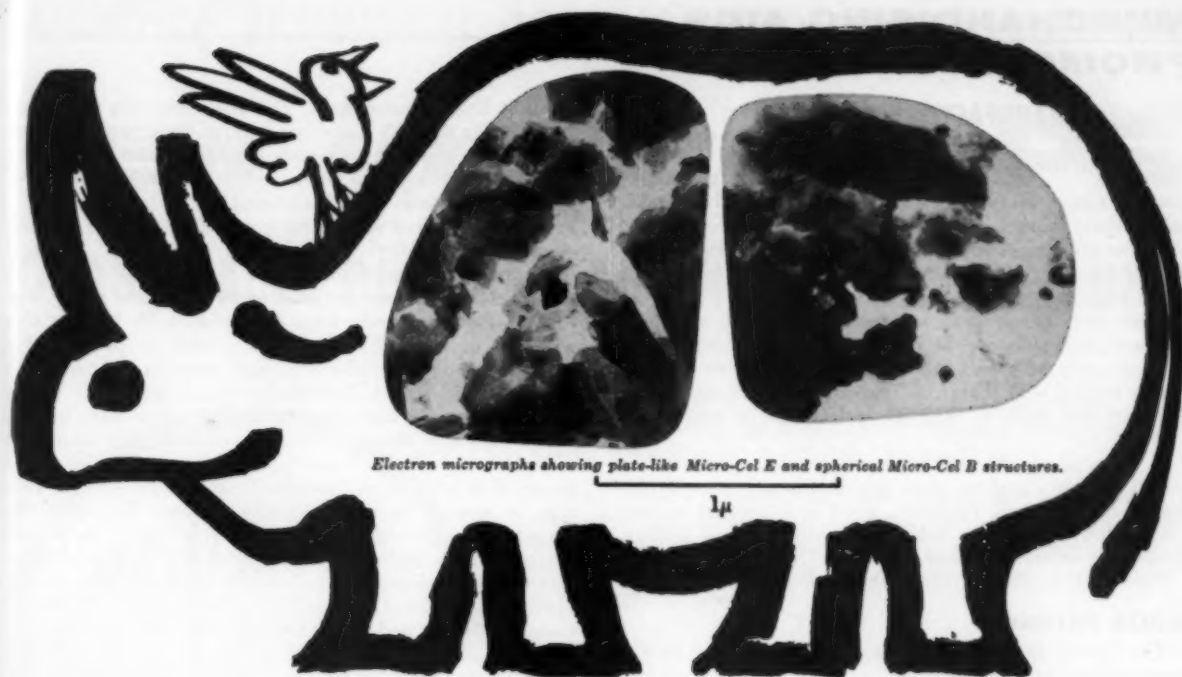
If your freight to a certain area is so high that you just cannot afford to try to reach that area, then you stay out of it. About the time that all is nice and cozy here comes a new product or a substitute product in the pioneering phase and the whole thing starts all over again.

As the present time plant food is in the process of moving from the pioneering into the competitive stage. There is a rapidly growing emphasis on the distribution of the product rather than on new products. From now on an advantage in freight or delivery or dealers will probably outrank the advantage of new blends and mixtures as a competitive gain.

#### THE NEW PLACE OF THE DEALER

Now the time has come to separate the men from the boys. In this new situation there will be quite a scramble to locate and secure good dealers. Each manufacturer will





Electron micrographs showing plate-like Micro-Cel E and spherical Micro-Cel B structures.

1μ

## Micro-Cel is quite compatible!

Micro-Cel®, Johns-Manville's new synthetic calcium silicate, is chemically inert and is compatible with nearly all toxicants. Micro-Cel cuts shipping costs by permitting such high toxicant concentrations as 50% Heptachlor, 70% Toxaphene and 75% DDT. Micro-Cel's unique structural characteristics (surface areas up to 175 sq. m/gr) reduce caking, improve flowability, increase suspendability and extend shelf life. For further information, samples and technical assistance, mail in the coupon below!

**JOHNS-MANVILLE**

Celite Division



1961

JOHNS-MANVILLE, Box 14, New York 16, N. Y.  
In Canada: Port Credit, Ontario.

☐ Please send further information.

I am interested in using Micro-Cel with the following toxicants: \_\_\_\_\_

☐ Please send free sample of Micro-Cel.

☐ Please have your local Sales Engineer contact me.

Name \_\_\_\_\_ Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ County \_\_\_\_\_ State \_\_\_\_\_

## MERCHANDISING AIDS PROMOTION

### What the MANUFACTURER

#### can do for the DEALER (Continued)

want to assure himself of a steady flow of product and a fairly steady market. The advantages of this in a competitive situation are tremendous. The best way to accomplish it is through good solid dealers who will be there every year with a nice increase in volume.

There are not too many good dealers in sight, and those that are good will soon be looking for the best offer from various manufacturers. They will be much more coy and harder to deal with. This is the time when the effort that the company has made to help its dealers will be well worth while.

If there is any brand that has secured a position like Coca Cola had about ten years ago, that brand has a loyalty that it can use well. However, there is a limit as to how long brand loyalty can hold both customers and dealers. Something substantial must be done.

There are, in general, three ways to handle dealers.

#### DEALER PATTERNS

**The Casual Dealer**—This type dealer is created by the manufacturer who gives a dealership to any one who will buy his product. He sends the stuff out on consignment and what the fellow sells is fine. There may be twenty of these dealerships in one county. This has been tried in many lines of merchandise and for some lines it is fairly satisfactory. What it amounts to is factory-direct-to-the-consumer under the disguise of a dealership. This pattern makes it almost impossible to develop a good dealer. These fellows will change with the latest price mark-up and can be easily stolen by another manufacturer. The dealer has nothing invested and nothing to protect, and, of course, the manufacturer has nothing in him.

**The Name Dealer**—This is the ordinary pattern for a lot

of short line manufacturers. The dealer handles such line of your merchandise as he can buy and sell profitably. He is usually a multiple line store—meaning that he handles several things, such as feed, seed, fertilizer, maybe petroleum, or hardware. He is franchised in a sort of casual manner and does have something invested in the line of merchandise, although the manufacturer has little if any real influence on this merchant.

In this pattern we do meet some very fine single line dealers. Here the dealer buys one product. He lives or dies with this product. His investment is with the product; his trucks, billboards, stationery, and store front carry the manufacturer's label. This dealer has a real stake in the manufacturer and the manufacturer has a real stake in him.

**The Full Line Dealer**—This type of dealership involves a manufacturer who has a wide diversification, and can afford to put in a full line of products on a dealer's shelves. This type of store is usually an associate store, for which the manufacturer provides guidance, merchandising helps, advertising helps, and some real store aids from district managers whose business it is to help the retailers. This type of operation is typified by John Deere, Western Auto, Gambles, General Motors and Ford dealers. Over the long run, depending upon the real merchandising know-how of the manufacturer, this pattern provides a very stable market.

#### THE DISTRIBUTOR PATTERN

This pattern seems highly unlikely to develop in the farm chemicals field, although it could. This would entail the rise of a major distributor who would even own some manufacturers such as J. C. Penney, Sears and Roebuck, and Montgomery Ward.

This then should conclude the survey of the market which seemed essential to the study of what the manufacturer can do to help the dealer.

*Next month:* Common ground—the manufacturer and the dealer.

### How Niagara Reorganized

#### for PROFIT (Continued from page 18)

and confirmed by consultation with those having experience and skill in the field, we inquired whether top management philosophy—I'm referring now to corporate—was compatible with that prevailing in the consumer goods marketing world. We found it was not compatible.

You've heard it many times—"sell the Chairman of the Board on the need for marketing." We couldn't do it.

Our top management was not interested in further diversification by this route. They would not go along with buying the elements for success. We had no doubts about our ability to succeed in this field—if we could bring into the organization the necessary skills and experience and money that would be necessary.

#### BACKING UP IS DIFFICULT

We then decided to scrap the department. This decision created problems from all quarters. Top management again resisted such action. The principal product of this line was set up with a good deal of fanfare and top management enthusiasm.

The 70 per cent gross margin made their mouths water! Successful people are reluctant to admit mistakes to their associates. It hurts their pride. Backing up is difficult when the normal direction is forward.

Customer relations in such a withdrawal are a headache. Dealers and distributors with stocks of consumer goods on their shelves once heavily supported by advertising, and

then with no support, had good reasons to gripe. Ex-employees without jobs don't all "love" you. Those with patents who see royalties deferred until the product can be relocated don't agree with such decisions. Well, we liquidated the department and stopped the losses.

Through the years, promises of exclusive new products were made to the sales group, in what is now the agricultural department, to sustain their morale. Every pesticide salesman dreams of the day when he can overcome his competitors with new products in great demand. Several of our new products were in development in the transition years I have been describing.

The decision of marketing these materials through other channels of the industry—making them non-exclusive to our agricultural department—was a hard blow. It raised storms of protest. The conflict between the two involved departments is not yet resolved. Specific situations between these two departments are arbitrated as objectively as possible for the benefit of the division.

An example of an error that we made in the early part of this period was in the sale of plant and withdrawal from the marketing area. We are sure now that under our present methods we could have been making profits in the area today. We got out because we thought we were losing money. It'll be costly to get back in.

Decentralization has continued. Today there are eighteen profit centers in the domestic division. Now you expected to hear a success story. Were we successful? In three years, our rate of return on investment improved several-fold, profits were multiplied and volume of sales increased significantly.

ANOTHER TECHNICAL ADVANCE FROM WEST VIRGINIA

# NEW **ImpactTAPE**<sup>TM</sup>

## DRASTICALLY REDUCES SEWN-END BAG FAILURE



Pioneer in the development of Clupak\* extensible paper, West Virginia now leads the way to a far stronger, tighter, money-saving sewn multiwall through "ImpactTape."

ImpactTape is a revolutionary new type of sewn tape closure\*\* that adds four layers of tape to the sewn end instead of the conventional two. This provides 49% greater toughness than standard sewn 70-lb. tape closures plus a new "cushioning" against impact shock.

### PROOF from actual field trial

A leading cement company had an unusually high sewn valve breakage rate of 1%. They packed a trial shipment of bags, using West Virginia's new ImpactTape. Average breakage rate went down to .3%—a reduction of 70%. Dollar savings from reduced breakage will far exceed the small upcharge for the new closure.

### PROOF from new testing technique

The development of ImpactTape was hastened by West Virginia's successful adoption of the Impact Resistance Tester to measure sewn end toughness under conditions of sudden shock. It represents the only sewn closure test devised thus far which bears a predictable correlation to drop tests and actual field performance.

Studies indicate that 70% of sewn bag breakage ordinarily is at the sewn closure, even on Clupak paper bags, because the sewn closure is the weakest point in the bag. Often this breakage was incorrectly blamed on the paper. Now stronger ImpactTape opens the door to profits from the greater toughness and possible basis weight reductions which Clupak paper is delivering to thousands of users. *This is realistic research achievement—aimed straight at reducing your total packaging costs.*

For a brochure giving detailed information, write and tell us whether you use sewn open mouth or sewn valve bags. Multi-wall Bag Division, West Virginia Pulp and Paper Company, 230 Park Ave., New York 17, N. Y.

\*Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications.

\*\*Patent Pending.



**West Virginia  
Pulp and Paper**



### **Ag pilots talk safety, taxes**

By W. J. MONAHAN

**S**AFETY control and effective application of toxic materials and the use of aircraft in applying chemicals in forest fire suppression were key items of discussion as the 11th annual convention of the California Agricultural Aircraft Association was staged by 450 operators and pilots, in Sacramento the first week in January.

California's new director of agriculture, Dr. James T. Ralph, making his first speech as farm chief of the Golden State, described farm aircraft as the most vital factor in the state's pest control and its industry members as important guardians of public health in the handling of agricultural chemicals.

Ralph headed a panel of departmental aids which discussed the use of toxic materials in agriculture and voiced assurance that use of chemicals by aircraft in California was not endangering public health nor contaminating farm products. He was joined in a discussion of drift and residue regulations and techniques by Robert Rollins, chief of the Bureau of Chemistry; Stuart Turner, San Francisco agrologist; C. W. Morley, Kern County agricultural commissioner, and George Weldon, president of the Western Agricultural Chemicals Association.

"California," Ralph told the convention, "is close to being the most heavily populated state. In California, aircraft operators apply one-tenth of the nation's pesticides and they apply them in one of the most heavily populated areas. You have a big responsibility in creating an informed public awareness of the vital role you play in our economy. You need to do everything you can to avoid scares and fears about the proper use of agricultural chemicals."

#### **SURVEY RESULTS ENCOURAGING**

The state agricultural director disclosed to the "crop dusters" that a recently completed state survey—instigated by the 1959 cranberry scare—had proven, among other developments, that agricultural aircraft was living up to its responsibilities in the safe use of chemicals.

"A summary of the survey concerning chemical usage in California, conducted by a committee of recognized specialists," Dr. Ralph declared, "shows that our food supply is safe and that public health is not threatened in any general way."

Lee Myers, chief pilot of the U. S. Forestry Service, told the convention about new plans for forest fire suppression in California including plans for employment of 125 borate tanker planes in fighting forest fires.

The crop dusters who gathered at the swank El Dorado Hotel in San Francisco are still dashing and daring in the nature of their occupation, but are a far cry from the swash-bucklers of the air who pioneered use of farm aircraft in

pre-World War II days. Many of them are former war pilots including the famed Navy ace, Jim French of Bakersfield, who runs a crop dusting service and is West Coast distributor for Grumman.

The modern crop dusters and their pilots are solid businessmen concerned with operation costs, safety regulations, education, insurance plans and the fact that they are users of ten percent of the total output of the nation's farm chemicals.

They occasionally chat about the adventures of flying three feet above the ground in seeding, dusting or spraying farm fields but they are more interested in exchange of views on techniques in treating some 6,000,000 acres of range, forest and crop land.

They have a romantic interest in the unknown farmer who called an unknown pilot to spray a cotton field to save it from leaf hoppers in Georgia back in 1918 but they listen more intently to shop talk by chemists, agrologists and equipment salesmen.

As Wayland Fink, new president of the California association, pointed out crop dusting is now a business, a big business, and may become as technology moves ahead in Agriculture one of the most important branches of farming.

#### **COSTS ARE MOUNTING**

Operational costs of the 220 crop dusting firms in California who employ 750 pilots are mounting from post-war days when it was possible to go into business with \$1000 investment in a surplus plane, an open field and a second hand truck to haul chemicals.

Now a small firm will have an investment of \$100,000 in planes alone and the operator must have a working knowledge of chemicals and their tolerances in crop cultivation. Trained ground crews have replaced casual help and governmental regulation of safety and work practices has converted the boss crop duster into a combination of flier-mechanic-crop technician-business executive.

These changing ways of crop dusting and the future outlook for farm aircraft were topics of discussion in the three-day conference that saw Wayland Fink of Patterson replace Monty Landsiedel as president of the California Agricultural Aircraft Association.

Other officers elected were John Coulston of Oxnard, vice president; Robert Bunch of Arden, secretary-treasurer, and seven directors: Lee Sherwood (Willows); Douglas Gandy (Carruthers); Dale Fry (Tulare); Jack Garriott (Bakersfield); Norman Stanley (Imperial) Bob Phillips (Ceres) and Tom Fisher (Fresno.)

Out-of-state operator members reported at the convention were J. H. Henley, McAlester, Okla.; John Neace, Litchfield Park, Ariz.; Cal Butler, Redmond, Ore.; Bruce Coombs, Yakima, Wash.; W. A. Lewis, Houston, Tex.; Jack Hughes, Missoula, Mont.; John Mangum, Jr., Bay City, Tex.; Lloyd Nolen, Mercedes, Tex.; Richard Reade, Hayti, Mo.; Wallace Waterhouse, Honolulu, Hawaii; Delmer Miller, Delhart, Tex.

The association re-designated Wanda Branstetter to the post of executive secretary which she has held since 1954. Mrs. Branstetter—with 5000 flying hours—is the first American woman licensed to instruct pilots. She has been handling the association's business affairs for seven years.

Although the topic was debated in the halls, no convention action was taken on the proposal for a new plan of farm aircraft taxation in California. The plan calls for state licensing of aircraft with standard fees in all counties to replace the present system of assessing planes as personal property at county levels. Under the current system, taxation rates vary from county to county. The new program would establish equal fees and return them to the counties in the same way automobile-truck fees are now handled in California. It will be reviewed at the Association's February meeting of the board of directors.



# WHAT ARE DRI-SOL<sup>®</sup> BENEFITS IN MIXED-FERTILIZER PRODUCTION?

REDUCED SHIPPING COSTS

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INCREASED PLANT CAPACITY

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IMPROVED FERTILIZER QUALITY



More and more fertilizer manufacturers are turning to DRI-SOL ammoniating solutions as a sure, time-tested way to lower production costs and improve mixed-fertilizer quality.

For in addition to the eight cost-saving and quality-building advantages shown above, DRI-SOL can also help manufacturers offset the high water content of low-strength acid. It also helps to produce grades which are

difficult or impossible to make with conventional solutions.

*What grade of DRI-SOL meets your needs best?* From a wide choice of formulations you can select the solution that offers you the greatest number of advantages. Each grade contains less than 0.5% water. Grades range from 24% ammonia and 76% ammonium nitrate, to 50% ammonia and 50% ammonium

nitrate, and are generally available in all the Southern and Midwestern States.

Why not get complete information? Technical data to fertilizer manufacturers available upon request. Write: Agricultural Chemicals Department, Commercial Solvents Corporation, 260 Madison Avenue, New York 16, New York. Offices also located in: Atlanta, Shreveport, St. Louis.

**COMMERCIAL SOLVENTS CORPORATION**



# Non-BURNING

*Compare results with the new 8-40-0 fertilizer, conventional fertilizer and no fertilizer.*



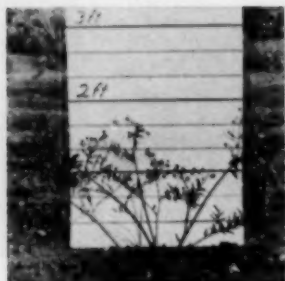
**Red pine**—conventional fertilizer in planting hole.



**Red pine**—no fertilizer.



**Red pine**—4 ounces 8-40-0 in planting hole.



**Crape myrtle**—no fertilizer.



**Crape myrtle**—4 ounces 8-40-0 in planting hole.



**White birch**—no fertilizer on left compared with 4 ounces 8-40-0 in planting hole.



**Zlm (Jap. Zelkova)**—no fertilizer on left compared with 4 ounces 8-40-0 in planting hole.

**W**HAT'S new under the sun? A family of metal ammonium phosphate fertilizers for use as a "nonburning fertilizer" in semicommercial production was announced recently by W. R. Grace & Co.

A magnesium ammonium phosphate fertilizer that will not burn or injure roots or foliage, it will be available for use as a fertilizer on turf, vegetable gardens, shrubbery, flowers and trees, the company reported.

The new fertilizer is composed of 8 per cent nitrogen, 40 per cent available phosphate and 24 per cent magnesium oxide (8-40-0). Developed especially for the forestry industry, this compound may be applied at a heavy rate, according to the company.

This non-burning fertilizer is one of a new family of metal ammonium phosphate compounds produced through an exclusive process at Grace's Washington Research Center in Clarksville, Maryland.

Field tests have indicated a second metal compound, ferrous ammonium phosphate, (7-35-0) to be equally effective in some forestry applications. However, at this time it is primarily recommended for use in nursery beds. When required, a mixed fertilizer may also be produced using the (8-40-0) grade as a base which will employ all of the essential elements needed for plant life.

Grace's Research Division has been applying magnesium ammonium phosphate to trees for the last three years. During this period, seeds have germinated and been grown in pure fertilizer materials. To further illustrate the non-burning quality of this compound, it has been applied in areas where moisture content of the soil is below normal, yet no increase in burning resulted.

Another major feature in magnesium ammonium phosphate is the controlled rate of nutrient release which allows the fertilizer to be tailor-made to meet the needs of the customer. Grace's new compound makes the various plant nutrients slowly available over an entire growing season. Controlled nutrient release means *larger* but *fewer* applications than are usual with present commercial fertilizers at a considerable saving in time and labor. This also represents a saving in fertilizer, since less of the nutrients are leached from the soil before they can be used by the plants.

The company says this highly efficient fertilizer will not cake and is easy to apply. Unlike conventional fertilizers, magnesium ammonium phosphate can be applied through a hopper on a planting machine and is therefore much more economical than a separate side-dressing operation for conventional fertilizers.

After a one year growing season, seedlings treated with magnesium phosphate showed these effects: 85 per cent survival in the Lombardy Poplar as compared with 46 per cent in the unfertilized; Red Pine quadrupled new growth over the unfertilized and the Balsam Fir doubled new growth over unfertilized seedlings of the same variety.

Currently in semi-commercial production, Grace's new magnesium ammonium phosphate is priced slightly higher than conventional field fertilizers.

# G FERTILIZER

## EXPERIMENTAL RESULTS with 8-40-0

**T**O demonstrate non-burning characteristics a large selection of tree, field crop, and grass seeds were germinated and grown in the pure material for a period of several weeks under laboratory conditions. Similarly, bare-rooted evergreen seedlings were planted in pure material and grown for a month without burning. In a large scale field experiment bare-rooted one year old peach trees were planted in a 1:1 mixture of soil and 8-40-0. Up to 10 pounds of 8-40-0 were used per tree. There were no fatalities. There was an excellent response at all rates of application.

Large scale field research experiments have included one pound of 8-40-0 in the planting slit under bare-rooted tree seedlings of many varieties of commercially important forest trees and ornamentals.

The solubility of the magnesium and ferrous ammonium phosphates is very low. Nutrients become available both by dissolution and by nitrification. The latter is the major influence and is dependent upon particle size, soil moisture and temperature. Experimental results with turf, vegetable and tree crops have shown that both compounds when properly sized will not dissolve and leach away from the root system.

### CONTROLLED NUTRIENT RELEASE

The factors affecting nutrient release also contribute to the non-leaching characteristics. The size and density of the particles as well as placement in the soil are perhaps the most important. Mixed fertilizers containing magnesium ammonium phosphate were prepared for turf and these lasted for a full year after application. Other mixtures using 8-40-0 and 7-35-0 in the peach tree experiment previously mentioned were sized and placed to last six to eight years.

The compounds presently recommended for forest tree nurseries are designed to last about 8 months depend-

ing upon size, placement, and rate of application. The coarse particle size for out-planting tree seedlings is designed to last for 2-3 years if placed directly into the planting slit. A major advantage is that nitrification and thus availability of nutrients is most rapid during periods of warm weather when the tree is growing vigorously but slows up greatly during the winter months when the trees are dormant.

### APPLIED IN PLANTING SLIT

Results with the addition of 8-40-0 in the planting slit of thousands of forest tree seedlings of many varieties indicate that while the seedling is able to utilize the fertilizer, competitive growth does not benefit. Of primary importance is the fact that 8-40-0 can be placed directly with the seedling root several inches under the soil. Conventional fertilizers top-dressed feed weeds and undesirable species whereas 8-40-0 placed in the planting slit does not. Furthermore, translocation of nutrients to the surface is negligible compared with conventional fertilizers placed under the soil at a safe distance from the seedling. In case of the latter, competitive weeds were greatly stimulated.

The 8-40-0 can be applied in the planting slit when the tree seedling is set out. A second operation of top-dressing is unnecessary. When using a mechanical tree planter a fertilizer hopper can be installed to dispense the proper amount of fertilizer under the seedling. Men hand planting trees can put fertilizer under the seedling in a similar manner. Both materials are non-toxic, non-corrosive to metals and non-caking.

Ease of control of particle size and placement, as well as the fact that nutrient release by nitrification takes place mainly during periods of vigorous growth, makes this a highly efficient fertilizer. Comparisons of 8-40-0 with conventional fertilizers on turf, vege-

table, field crop, and trees have demonstrated a greater nutrient recovery from 8-40-0.

### RESULTS WITH TREE SEEDLINGS AND ORNAMENTALS

During the past three years many varieties of tree seedlings and ornamental plants have been fertilized with 8-40-0. These were carefully designed research tests in several parts of the United States. With most varieties survival of seedlings fertilized with moderate amounts of 8-40-0 was as great as that of unfertilized seedlings. Survival of some species was greatly improved by fertilization with 8-40-0. Data from all sites is not available as yet. Examples of typical survival and growth data follow.

Survival of Lombardy poplar fertilized with 8-40-0 was 84 per cent compared with 46 per cent of those not fertilized.

The length and oven-dry weight of terminal growth of balsam fir in a nursery bed fertilized with 8-40-0 was twice as great as that of the unfertilized bed. With red spruce under the same conditions, length and oven-dry weight was four times as great.

During the first growing season following planting and fertilization with 8-40-0, 2-0 stock of sugar maple, red oak, and locust gave excellent growth responses to the fertilizer. Virginia pine, red pine, white pine, loblolly pine and Norway spruce gave reasonable but less spectacular responses. Bare-rooted nursery stock of white birch, Norway maple, and pink redbud gave excellent response to fertilization. Under similar conditions pin oak, Chinese elm, Japanese holly, American holly and ash gave good responses.

Flowering varieties of trees and shrubs fertilized with 8-40-0 bloomed earlier and more profusely than unfertilized ones.



## PEST REPORTS *By Kelvin Dorward\**

### GRASSHOPPER INFESTED RANGE ACREAGE DOWN

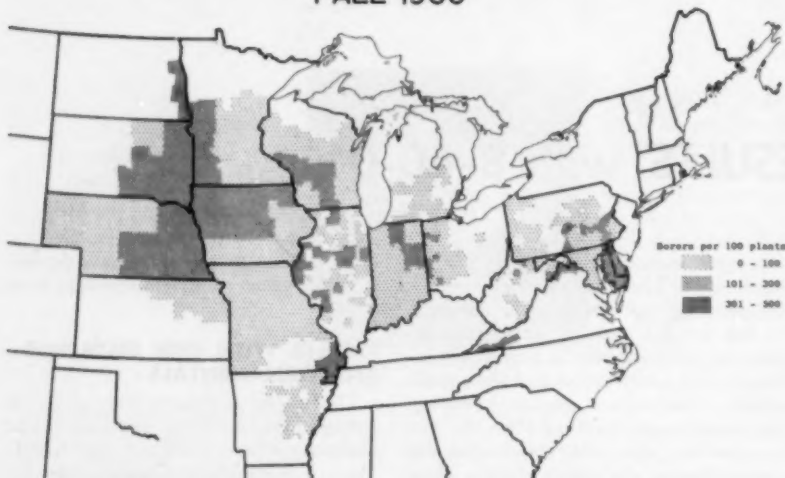
The annual fall adult grasshopper survey shows fewer acres of rangeland with a moderate or above population, 8 or more grasshoppers per square yard,

than was found in the fall of 1959. The total acreage of range in the above category is 4,467,720 compared with 5,667,010 in 1959. Montana has the largest infested acreage with 1,327,000 followed by California with 882,800.

Colorado, with 618,000 acres, Washington with 454,700 acres, and Texas with 353,700 are the next highest states.

The adult grasshopper infestations on croplands found in the fall of 1960 were slightly higher than those found in the fall of 1959. The increase is largely in North and South Dakota, Minnesota, and Wisconsin.

### EUROPEAN CORN BORER ABUNDANCE FALL 1960



Fall counts of the European corn borer were higher than in '59 in most of the states reporting. The map was prepared by Survey and

Detection Operations, Plant Pest Control Division, ARS, USDA, December 1960. No figures are available for counties not shaded.

### HIBERNATING WEEVILS HIGHER IN NORTH AND SOUTH CAROLINA

Woods trash samples were collected by cooperating agencies from four areas in North and South Carolina to determine the number of boll weevils entering hibernation. Average counts were higher than found in the fall of 1959.

In the south central section of South Carolina comprised of Orangeburg, Bamberg, and Dorchester Counties, average number of live boll weevils found per acre of woods trash was 3,308 compared with 1,318 in 1959.

Although weather will be a definite factor in the number of boll weevils entering the cotton fields next spring, the fall populations are such that the potential bears close observation.

\*Chief Staff Officer, Survey & Detection Operations, Plant Pest Control Div., Agricultural Research Service, USDA.

## BUILT TO CARRY THE LOAD

### FULL EQUALIZED AXLES—NO SPRINGS TO BREAK



**MODEL N-48  
FERTILIZER  
SPREADER**

#### SPECIFICATIONS

8 tires  
Length—8 ft.  
Capacity—4 tons  
Width of Spread—50 ft.  
Rate of Spread—60 to 350 lbs. per acre  
(gearing for higher or lower spreading rates, optional)

### CARRIES 5 TONS EASILY!

Both the 4 ton Model N-48 and the 2 ton Model N-28 are shown overloaded with 5 tons of bagged fertilizer to prove load carrying capabilities.

- Stainless steel metering gate and guides, micro-meter adjusting screw and full 12" stainless steel conveyor.
- Adequate flotation for soft fields.
- Less cutting and packing fields.
- Direct PTO fan drive gives 50 ft. spread.
- All-weather wheel drive assembly.
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- Can be pulled by any tractor.



**MODEL N-28  
FERTILIZER  
SPREADER**

#### SPECIFICATIONS

4 tires  
Length—8 ft.  
Capacity—2 tons  
Width of Spread—50 ft.  
Rate of Spread—60 to 350 lbs. per acre  
(gearing for higher or lower spreading rates, optional)

#### WRITE, WIRE OR PHONE COLLECT

for further information about the N-48 and N-28 pull-type spreaders, plus a full line of other bulk fertilizer spreaders and bodies, bulk feed bodies, bulk and sack bodies and unloaders.



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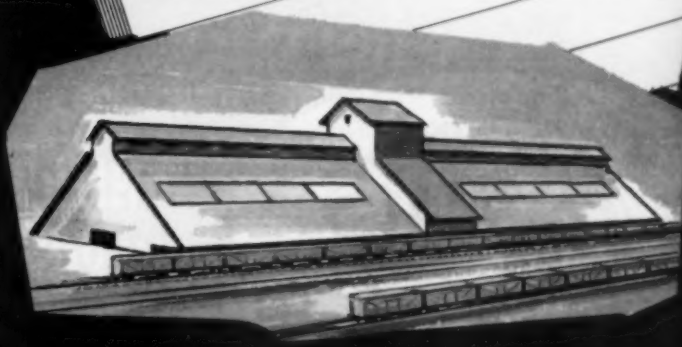
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## PATENT REVIEWS *By Melvin Nord*

### FERTILIZERS

**U. S. 2,955,917**, issued Oct. 11, 1960, to Edward S. Roberts and Michael J. Kalous, describes a process and apparatus for the manufacture of nitric acid at elevated pressures, in which heat concentrated by the compression of air in the air compressor is recovered and conserved as energy for operating the compressor.

**U. S. 2,955,918**, issued Oct. 11, 1960, to Robert A. Ruehrwein and assigned to Monsanto Chemical Co., discloses a method of removing from phosphoric acid trivalent iron impurities dissolved in it. The method consists of dissolving in the acid sufficient chloride ion to obtain at least a 0.1 molar concentration contacting the acid with a water-insoluble phosphate ester in a liquid form sufficiently immiscible with the acid and in sufficient amount to form a separate liquid phase in contact with the acid, so that a substantial proportion of the iron in the acid phase is extracted.

**U. S. 2,955,919**, issued Oct. 11, 1960, to Joseph F. Wilson and assigned to Phillips Petroleum Co., discloses a method for stabilizing crude wet-process

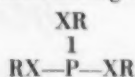
phosphoric acid containing impurities which precipitate as solids.

**U. S. 2,955,930**, issued Oct. 11, 1960 to Joseph P. Kealy and assigned to Swift & Co., describes a process for the manufacture of a urea-formaldehyde condensation product in the presence of a substantially dry fertilizer solids substrate. The urea-formaldehyde product has a water-insoluble nitrogen availability index of at least 40.

**U. S. 2,963,359** issued December 6, 1960 to G. F. Moore and Thomas Beer, assigned to Tennessee Corporation, describes a process for producing a granular modified diammonium phosphate, 18-46-0.

### HERBICIDES AND PLANT GROWTH REGULANTS

**U. S. 2,955,803**, issued Oct. 11, 1960 to Lewis E. Goyette and assigned to Virginia-Carolina Chemical Corp., discloses a method of defoliating plants having an annual leaf-drop, utilizing a phosphorothioite having the formula




where X is O or S (at least one being S), and R may, for example, be phenyl or substituted phenyl.

**U. S. 2,955,929**, issued Oct. 11, 1960, to David E. Ramey, William J. Hughes, and Johannes Van Overbeek and assigned to Shell Oil Co., describes a method for the destruction of weeds by treatment with a trinitro-xylene compound.

**U. S. 2,957,761**, issued Oct. 25, 1960 to Edwin A. Davis and assigned to The Dow Chemical Co., discloses a method for improving the plant growing properties of soil by impregnation with 4-chloro-2-butyne-1-ol.

**U. S. 2,958,595**, issued Nov. 1, 1960 to Giovanni Pellegrini, Pietro Scrivani, and Araldo Bugiani, and assigned to Montecatini Societa Generale per l'Industria Mineraria e Chimica, discloses compositions based on 2, 4-dichlorophenoxyethanol for weed control in the rice fields.

**U. S. 2,959,475**, issued Nov. 8, 1960 to Raymond W. Luckenbaugh and assigned to E. I. duPont de Nemours & Co., discloses a method and new composition for the control of weeds.



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Exclusive Sales Agents For:

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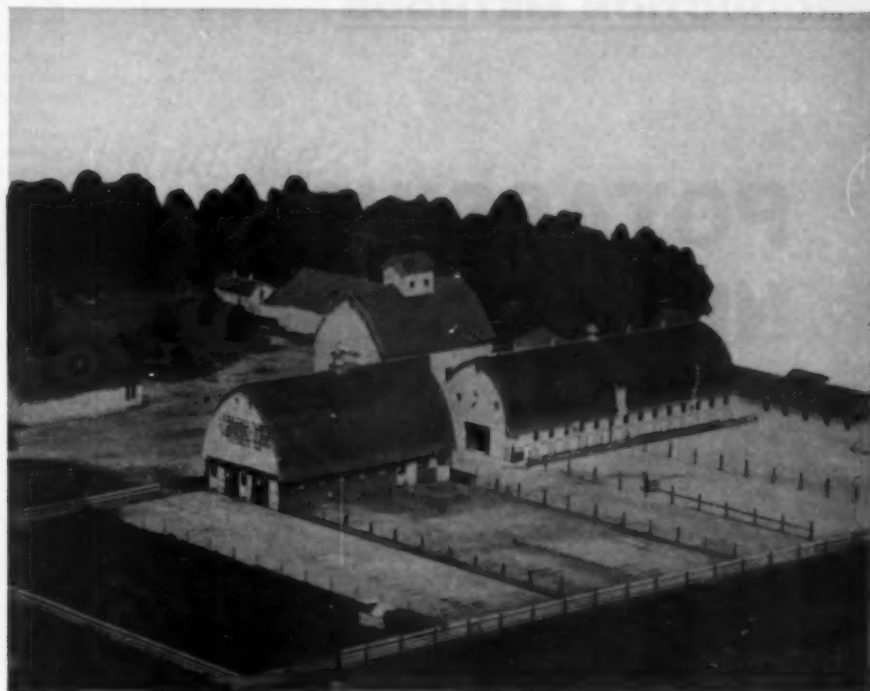
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# POTASSIUM NITRATE

*in mixed fertilizers*

Expected increase in future supplies of potassium nitrate for use as fertilizer prompted experiments on the granulation of mixtures containing this salt and on the caking and hygroscopicity of the resulting products.

Popular grades of tobacco fertilizers formulated with potassium nitrate as a source of potash remained in excellent physical condition during an extended period of storage in bags. High-analysis mixtures (8-16-16 and 10-10-10), containing large percentages of potash in the form of potassium nitrate, granulated satisfactorily and had storage characteristics at least as good as those similarly prepared with all of the potash from other sources.

By JOHN O. HARDESTY\*,  
GEORGE F. DICKEY<sup>1</sup>,  
and BOYCE M. OLIVE\*

**E**XPECTED new production facilities for increasing the supply of fertilizer-grade potassium nitrate stimulates considerable interest in the properties of this material with respect to its behavior in mixed fertilizers during processing and its effect on the physical quality of the resulting products.

Potassium nitrate (saltpeter) is one of the oldest known chemical salts and was first suggested for use as a fertilizer by Glauber in 1656 (14). Many workers have since demonstrated its agronomic value as a source of both nitrogen and potassium (19). Some small

quantities of the chemically pure salt from domestic production have been used for formulating small-package, soluble mixtures. However, potassium nitrate for use in general fertilizer mixtures and for direct application has been derived principally from small annual imports of relatively pure salt from Europe and potassium-sodium nitrate from Chile. The latter is, typically, a 15-0-14 fertilizer containing about 30 per cent potassium nitrate. United States imports of these materials in recent years are listed in Table I.

High cost of production has been the chief reason for the low usage of potassium nitrate as fertilizer. Since there are no known areas of large deposits in concentrated form, a common method of manufacture for industrial use has been by the double-decomposition reaction between sodium nitrate and potassium chloride. Little if any of this has been used as fertilizer. Prior to World War II the United States imported some high-grade potassium nitrate from Germany where it had been produced by the double decomposition of potassium chloride and ammonium nitrate (7).

In a review of the literature on the manufacture of potassium nitrate in 1934, Whit-

taker and Lundstrom (19) concluded that the final solution to the problem of producing this salt cheaply enough for extensive use as fertilizer would involve a process that utilized the reactions between nitric acid or oxides of nitrogen and potassium chloride in a way similar to that by which sodium nitrate is manufactured (8). Apparently, production of potassium nitrate by such a process is nearing realization, and at least one plant is scheduled for construction (4). Providing the price is competitive with that of  $K_2O$  in potassium sulfate and of nitrogen in present sources of solid nitrogen carriers, it seems likely that a considerable tonnage of potassium nitrate will be used on various crops, such as tobacco, in which an adverse effect on quality occurs when large amounts of chloride ion are present in the soil.

In this connection the properties of potassium nitrate alone and in admixture with other fertilizer salts are of primary interest to the mixed-fertilizer manufacturer and the ultimate consumer.

## BEHAVIOR

Potassium nitrate is produced normally in the form of colorless rhombic crystals melting at 333° C. The pure salt ( $KNO_3$ ) contains 13.85 per cent nitrogen and 46.58 per cent  $K_2O$ . It undergoes transition to other crystalline forms at 126° and 129° C., well above the usual granulation temperature for mixed fertilizers. Its decomposition temperature is 400° C. Typical particle size distribution in a granular product made in a pilot plant was 7 on 14, 63 on 20, and 93 per cent on 28-mesh Tyler Standard screens. The product was a 13-0-46 fertilizer and had satisfactory storage properties.

It is anticipated that the particle size, chemical analysis and storage properties of the future commercial product will be of this order. Its solubility in water increases rapidly with increase in temperature (Table II). As compared with the solubility of common potash and nitrogen carriers excepting potassium sulfate, it is the least soluble at low temperatures, and, excepting urea and ammonium nitrate, the most soluble at high temperatures.

Potassium nitrate is among the least hygroscopic of fertilizer materials. At 30° C. (86° F.) it does not begin to absorb moisture from the air until the relative humidity is 90.5 per cent as compared with 84 per cent for potassium chloride under the same conditions. In admixtures with other individual salts, potassium nitrate produces less hygroscopic mixtures than potassium chloride, except with ammonium salts other than ammonium nitrate (3, 15). An example of the exception is a mixture of potassium nitrate and ammonium phosphate which tends to form some very hygroscopic ammonium nitrate.

Potassium nitrate is very soluble in nitric acid forming acid potassium nitrate ( $KNO_3 \cdot 2HNO_3$ ) under some conditions. For example,

TABLE I. U. S. Imports of Potassium Nitrate and Potassium Sodium Nitrate in Recent Years<sup>1</sup>

YEAR	IMPORTS (Short tons)	
	Crude Potassium Nitrate	Crude Potassium-Sodium Nitrate
1951	6,453	8,249
1952	25,719	16,460
1953	15,941	12,516
1954	5,141	8,819
1955	1,118	19,300
1956	924	19,451
1957	642	25,393
1958	346	23,508
1959	473	36,438

<sup>1</sup> Source: U. S. Bureau of the Census Reports No. PT 110 (1951-59).

TABLE II. Comparative Water-Solubilities of Some Potassium and Nitrogenous Fertilizer Materials

TEMPERATURE		APPROXIMATE SOLUBILITY IN 100 GRAMS WATER						
°C.	°F.	$KNO_3$	KCl	$K_2SO_4$	$NaNO_3$	$(NH_4)_2SO_4$	$NH_4NO_3$	Urea
----- Grams -----								
0	32	13	28	7	73	70	118	67
10	50	21	31	9	81	73	158	84
20	68	32	34	11	88	76	195	105
30	86	46	37	13	96	78	242	133
40	104	64	40	15	103	81	297	166
50	122	86	43	17	113	85	344	205
60	140	110	46	18	123	87	421	246
70	158	138	48	20	136	91	499	315
80	176	169	51	21	148	94	580	410
90	194	202	54	23	161	98	740	542
100	212	246	57	24	178	102	871	745



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# PRODUCTION METHODS

## POTASSIUM NITRATE (Continued)

TABLE III. Formulas for Tobacco Fertilizers

MATERIAL		GRADE AND MIXTURE NO.					
		3-9-9			4-8-12		
Kind	Analysis Basis N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O	1	2	3	4	5	6
	%	Pounds per ton					
Superphosphate	0-20-0	910	910	380	810	810	280
6-17-0 base mixture <sup>1</sup>	6.7-17.3-0	...	...	612	...	...	612
Ammoniating Soln.(22-65-0)	41-0-0	100	100	...	150	100	...
Process tankage	10-0-0	200	...	...	210	...	...
Potassium nitrate	13-0-45	...	154	154	...	316	316
Potassium sulfate	0-0-50	193	36	32	240	...	...
Sulfate of potash magnesia	0-0-22(18.5MgO)	130	155	165	280	182	220
Potassium chloride	0-0-60(47.5 Cl)	100	100	100	100	100	87
Dolomitic limestone	(20 MgO)	173	150	139	210	100	100
Organic conditioner	.....	...	200	200	...	210	210
Filler	.....	194	195	218	...	182	175
Total		2000	2000	2000	2000	2000	2000
Ammoniation rate, lbs. NH <sub>3</sub> /unit P <sub>2</sub> O <sub>5</sub>		2.44	2.44	3.08 <sup>2</sup>	4.13	2.75	3.46 <sup>2</sup>
Nitrate N, % of total N		19	52	33	21	64	50
Ammonia N, % of total N		48	48	37	55	36	28
Natural Org. N, % of total N		33	...	...	24	...	...
Synthetic Org. N, % of total N		...	...	30	...	...	22
MgO, lbs./ton		59	59	59	94	54	61
Cl, lbs./ton		48	48	48	48	48	41
Physiol. basicity, lbs. CaCO <sub>3</sub> equiv./ton		100	112	100	100	100	100

<sup>1</sup> A commercially ammoniated superphosphate prepared with ammoniating solution designed to form urea-formaldehyde reaction products in the mixture.

<sup>2</sup> Calculated to include the portion of superphosphate that was not ammoniated in mixtures 3 and 6.

TABLE IV. Crushing Strength of Cake in High-Analysis Granulated Mixtures Formulated with and without KNO<sub>3</sub>

INGREDIENTS		GRADE, NO., AND FORMULA					
		8-16-16		10-10-10		15-10-10	
Kind	Analysis	7	8	9	10	11	12
	%	Pounds per ton					
Superphosphate	20.0	418	649	804	1000	257	496
Superphosphate	48.0	493	396	82	...	311	211
Anhyd. NH <sub>3</sub>	82.2	64	49	64	49	49	49
NH <sub>4</sub> NO <sub>3</sub>	35.0	188	188	211	211	449	449
(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	20.5	203	...	420	209	500	289
KCl	60.0	534	283	334	72	334	72
KNO <sub>3</sub>	13.0-47.0	...	320	...	334	...	334
Dolomite	....	100	100	100	125	100	100
Description of Sample		Caking Tendency Crushing strength of fertilizer cake, p.s.i. <sup>1</sup>					
Granulated <sup>2</sup>		21 ± 10	38 ± 24	70 ± 30	88 ± 19	197 ± 15	356 ± 12
Granulated <sup>3</sup> and coated <sup>3</sup>		2 ± 1	3 ± 1	3 ± 1	3 ± 1	47 ± 6	50 ± 5

<sup>1</sup> The  $\pm$  values indicate 5% fiducial limits of the mean for 5 replications of the tests.

<sup>2</sup> Particle-size fraction, 10-20 mesh; moisture content, 2 percent.

<sup>3</sup> Two percent diatomaceous earth.

at a temperature of 22° C. (71.6° F.), 55.5 parts by weight of 100 per cent HNO<sub>3</sub> will dissolve 44.5 parts of potassium nitrate to give 100 parts by weight of saturated solution. On cooling this solution a solid phase, KNO<sub>3</sub> • 2HNO<sub>3</sub>, separates out.

### RELATIVE FIRE HAZARD IN STORAGE PILES

In comparing the relative effect of different nitrogen carriers on spontaneous heating in storage piles of mixed fertilizer, Hardesty and Davis (10) found that potassium nitrate exhibits about the same reaction rate as sodium nitrate. Heat development is the direct result of oxidation of organic matter by nitric acid which accumulates in the mixture as a result of decomposition of nitrate salts. The presence of free acids, such as phosphoric

acid, and some organic matter in mixtures containing nitrate salts are prerequisites to the reactions which develop heat. The ignition point of such mixtures is about 200° F. but in experiments comparing the effects of equivalent quantities of sodium, potassium and ammonium nitrates on the ignition reaction (10), the ammonium nitrate produced far more vigorous reactions than either the sodium or potassium nitrates.

Spontaneous heating and occasional fires in storage piles containing fresh superphosphate, organic matter and nitrates are possible when neutralization of the potential free acid in the superphosphate component of mixtures is not completed. Neutralization of the superphosphate inhibits the formation of nitric acid, the oxidation reactions and the develop-

ment of heat in such mixtures. Thus, storage piles of present-day ammoniated mixtures, even though they may contain nitrate and organic matter, seldom exhibit spontaneous ignition. Nevertheless, nitrates are strongly oxidizing substances and, hence, must be handled or stored with caution. Railroad shipping instructions for nitrates of ammonia, calcium, sodium and potassium call for a yellow I. C. C. caution label.

### FERTILIZERS FOR TOBACCO

Recent studies in North Carolina (13) comparing the response of tobacco to ammonium and nitrate forms of nitrogen indicate that, on soils that have been fumigated to control nematodes, fertilizers containing nitrogen in the nitrate form increase the yield and quality index of tobacco. Recent recommendations of the tobacco workers conference (16) state that "preplant and side-dressing fertilizers should contain at least 30 per cent of the total nitrogen in the nitrate form." Rather than produce separate formulations for fumigated and non-fumigated soils, manufacturers of fertilizers used in such areas may prefer making all tobacco mixtures to conform to this 30-per cent minimum of nitrate nitrogen.

The requirement for a relatively high proportion of nitrate nitrogen, in conjunction with the well-known adverse effect of excess chloride ion on quality of the tobacco plant, make potassium nitrate seem well-adapted for use in tobacco fertilizers. Of chief concern is the physical condition, and especially the caking tendency, of mixtures containing high proportions of potassium nitrate. Accordingly, bag-storage experiments and laboratory caking tests were carried out on six mixtures, representing two typical grades of tobacco fertilizers, prepared according to the formulas given in Table III. They are all formulated to contain more than 2.5 per cent MgO and less than 2.5 per cent of chloride ion. They were physiologically basic equivalent to 100 pounds or more of CaCO<sub>3</sub> per ton.

Mixtures 1 and 4 are typical of present-day tobacco mixtures containing no potassium nitrate. They served as standards of comparison in the bag storage experiments and laboratory caking tests. Of the total nitrogen present 33 and 24 per cent, respectively, was from a natural organic source, as compared with none in the other mixtures of the series. Less than 25 per cent of the total nitrogen was in the nitrate form.

Mixtures 2 and 5 differed from the standard mixtures 1 and 4 in that more than 50 per cent of the nitrogen was in the nitrate form owing to the use of potassium nitrate in place of other nitrogen and potash carriers. Organic conditioner (humus) was used in these mixtures to offset the conditioning effect of the tankage in mixtures 1 and 4.

Mixtures 3 and 6 differed from mixtures 2 and 5 in that a 6-17-0 base mixture containing some urea-formaldehyde reaction product was used to supply some slowly-available nitrogen and a major proportion of the P<sub>2</sub>O<sub>5</sub>. Some ordinary superphosphate was used in these mixtures to bring the P<sub>2</sub>O<sub>5</sub> content up to grade. Mixture 3 contained 33 per cent, and mixture 6 contained 50 per cent, of the total nitrogen in the nitrate form.

The range in proportion of potassium nitrate in these six experimental mixtures seems adequate to cover most commercial formulations of present-day tobacco fertilizers requiring a high ratio of nitrate nitrogen to total nitrogen.

### BAG STORAGE TESTS

Each mixture (Table III) was prepared in sufficient quantity to permit conducting storage tests in duplicate on 40-pound bags at three moisture levels, 2, 4 and 6 per cent. The average particle-size analysis of this series of mixtures, in terms of percentage remaining on 10-, 35-, 65- and 150-mesh Tyler standard sieves, was: trace, 29, 49 and 76 per cent, respectively. The test mixtures were some-

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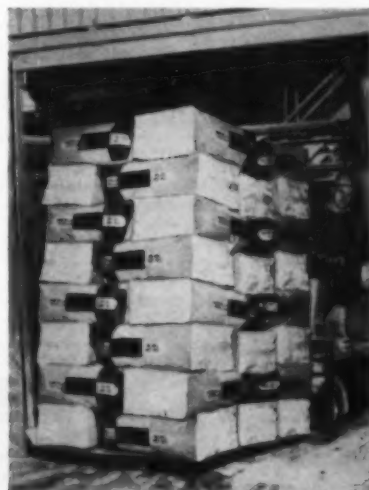


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# PRODUCTION METHODS

## POTASSIUM NITRATE (Continued)

TABLE V. Mixed Fertilizers by the Slurry Process

INGREDIENTS		FORMULA GRADE AND NO.					
Kind	Analysis	16-0-16		20-0-20		20-5-10	
		13	14	15	16	17	18
----- Pounds per ton -----							
With preneutralization							
Solution 414 (19-74-0)	(H <sub>2</sub> O 7%) (N 41.4%)	773	562	778	700	967	833
H <sub>2</sub> SO <sub>4</sub>	(100%)	423	307	426	383	438	386
H <sub>3</sub> PO <sub>4</sub>	(100%)	...	...	...	...	139	139
KCl	(60% K <sub>2</sub> O)	534	...	197	...	334	...
KNO <sub>3</sub>	(13% N, 47% K <sub>2</sub> O)	...	682	600	852	...	426
Dolomite	.....	304	468	33	94	149	254
Formula wet weight .....		2034	2019	2034	2029	2047	2038
Water removal to give 1% moisture in product		34	19	34	29	47	38
Formula weight of product containing 1% H <sub>2</sub> O		2000	2000	2000	2000	2000	2000
With solid ingredients <sup>1</sup>							
NH <sub>4</sub> NO <sub>3</sub>	(N 33.5%)	598	433	602	542	748	644
(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	(N 20.5%)	589	431	593	533	640	539
NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub>	(N 12.17%, P <sub>2</sub> O <sub>5</sub> 61.8)	...	...	...	...	163	163
KCl	(K <sub>2</sub> O 60%)	534	...	197	...	334	...
KNO <sub>3</sub>	(N 13%, K <sub>2</sub> O 47%)	...	682	600	852	...	426
Dolomite	(powd.)	259	434	...	53	95	208
Water in finished product		20	20	8 <sup>1</sup>	20	20	20
TOTAL		2000	2000	2000	2000	2000	2000
Caking Tendency							
Description of sample		Crushing strength of cake p.s.i. <sup>2</sup>					
Granulated <sup>4</sup> and coated <sup>5</sup>		47 ± 29	335 ± 79	312 ± 42	449 ± 184	158 ± 44	289 ± 119

<sup>1</sup> Mixtures prepared with solid ingredients are identical in composition with the corresponding mixtures simulating preparation by the preneutralization method.

<sup>2</sup> Final product is exceptionally dry.

<sup>3</sup> The ± value indicates 5% fiducial limits of the mean for 5 replications of the test.

<sup>4</sup> Size fraction, 10-20 mesh; moisture content, 0.5 percent.

<sup>5</sup> Two percent distomaceous earth.

what finer in particle size than would be expected in similar formulations of commercial products. Thus, any caking tendency which these types of mixtures might exhibit would likely be greater in these tests than in commercial storage practice.

After preparation the mixtures were cured for one week, adjusted to the desired moisture content, bagged in four-ply, polyethylene lined bags and stored in an unheated frame building for 3 months (January through March). Pile construction consisted in placing two 40-pound bags of the test mixture side by side on a 100-pound bag of sand and then stacking eight 100-lb bags of sand on top. A wooden framework held the piles in an upright position approximately 15 inches apart to provide equal air space around all test bags. The temperature during the storage period varied between 8° and 68° and averaged 39° F. The relative humidity varied between 41 and 100 per cent and averaged 71 per cent.

After 3 months the test bags were removed from storage and subjected to the procedure (17) for determining the degree of caking. In this procedure the bags are dropped from waist-height on each edge and each side to simulate normal handling of bagged fertilizers, opened, sampled for moisture determination and poured over a 3-mesh screen to remove lumps which are then weighed. The percentage and hardness of lumps, as determined by their weight and the length of time required to crush them through the screen, indicate the degree of caking.

All of the mixtures in the present tests developed a soft-to-medium set which disintegrated on handling the bag. Only three bags of the test mixtures contained any lumps whatsoever, and these were with mixture 4 at the 4- and 6-per cent moisture levels and with mixture 5 at the 6-per cent level, all three of which contained less than 1 per cent of very soft lumps. The average moisture con-

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tests of the mixtures before and after storage were, respectively, for the three levels of moisture, 1.97 and 2.06; 3.75 and 3.07; 5.40 and 4.43 percent; or average losses of approximately zero, 0.7 and 1 per cent during storage at the three respective moisture levels. Increasing the potassium nitrate content from none up to 316 pounds per ton of mixture had no apparent effect on the caking tendency of these tobacco fertilizers during storage of the bagged product for three months. These results were confirmed by those of laboratory caking tests.

#### LABORATORY CAKING TESTS

Mixtures 1 to 6 (Table III) were prepared in kilogram batches. Each batch was adjusted to a moisture content of six per cent, and allowed to stand at room temperature in an airtight container for 24 hours. Its free-moisture content was then determined by the AOAC vacuum desiccation method (5) and the caking tendency was measured by the modified method of Adams and Ross (1, 2) which gives the crushing strength of briquets previously formed under mechanical pressure in a caking bomb. The tests were made in replicates of five.

A sufficient amount of mixture was placed in each bomb to give a thickness of cake slightly greater than one inch. The pressure on the sample in the bomb was adjusted to 12 pounds per square inch (p.s.i.) and the bombs were stored for one week at a temperature of 30° C. The resulting fertilizer briquet, 2 inches in diameter and approximately 1 inch thick, was removed from the bomb, dried in an air-circulation oven for 72 hours at 50° C. and cooled in a desiccator. This drying procedure decreased the moisture content of the cake from 6 per cent to less than 0.5 per cent and insured the occurrence of maximum cementation under these conditions. The cake was then sanded to a uniform thickness of

one inch and its crushing strength determined by application of hydraulic pressure. Further details of the modified method have been discussed by Hardesty and Kumagai (11).

Results of the crushing-strength tests on briquets of the tobacco mixtures 1 to 6 were, respectively,  $24 \pm 3$ ,  $19 \pm 5$ ,  $16 \pm 4$ ,  $25 \pm 4$ ,  $29 \pm 4$ , and  $34 \pm 5$  p.s.i. The reliability of the results can be judged from the 5-per cent fiducial limit (18) appended to each mean value of replicate tests by a  $\pm$  sign. Subject to the usual assumptions, the odds are 19 to 1 that the true mean lies between the two limiting values.

The procedure for the laboratory caking test is intended to accentuate the severity of caking for the purpose of obtaining well-defined results. Based on past comparison of results of laboratory caking tests with those of bag-storage tests on mixed fertilizers (11), the low crushing-strength values obtained on the experimental cakes in the present tests indicate that no caking would occur under normal bag-storage conditions. These results confirm those of the previously-described bag-storage tests on these six tobacco mixtures.

#### HIGH-ANALYSIS GRANULATED MIXTURES

Potassium chloride is the chief potash carrier used in present-day, high-analysis, granulated mixtures. It tends to resist agglomeration and incorporation within the granule during the granulation of mixtures in conventional rotary equipment (9). The high solubility of potassium nitrate, as compared with that of potassium chloride at the normal granulation temperature of 212° F., (Table II), might be expected to improve the granulation characteristics of mixtures containing it. The possibility of future supplies of fertilizer-grade potassium nitrate thus kindles considerable interest in its effect on the processing, as well as on the physical condition, of high-analysis mixtures. Accordingly, lab-

oratory-scale granulation tests were conducted on high-analysis mixtures formulated as shown in Table IV, and laboratory caking tests were made on the granular products.

The source of potash in the odd-numbered mixtures (Table IV) is potassium chloride and that in the even numbered mixtures is principally potassium nitrate. The initial solid ingredients of each mixture passed a 10-mesh screen and the initial particle size of both potassium chloride and potassium nitrate was in the range of 10 to 35 mesh. Laboratory ammoniation was with anhydrous ammonia but the mixtures were formulated so as to permit the use of commercial ammoniating solution (410) 22-65-0 and, where necessary, some sulfuric acid to react with free ammonia in excess of that indicated in the formula.

Results of processing kilogram batches of these mixtures in a bench-type, rotating, ammoniator-granulator indicated that substitution of potassium nitrate for potassium chloride slightly decreased the moisture requirement for agglomeration. The potassium nitrate tended to agglomerate fairly well but produced a "popped-corn" shape of granule which effloresced on drying. The results of laboratory caking tests (Table IV) on the granulated products containing 2 per cent moisture showed no significant influence of potassium nitrate on the caking tendency of the 8-16-16 and 10-10-10 mixtures, although the crushing-strength of the cake tended to be slightly higher in the mixtures containing potassium nitrate and became significantly higher in the 15-10-10 mixture containing that salt. Addition of 2 per cent of diatomaceous earth as a coating agent virtually eliminated caking in the 8-16-16 and 10-10-10 mixtures and greatly decreased it in the 15-10-10. Of the coated products, only the 15-10-10 would be expected to cake during bag storage, and then to only a slight degree.

(Continued on next page)

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Since physical condition of the product is of primary importance, it seemed desirable to compare the effect of substituting potassium nitrate for potassium chloride in such mixtures on the caking tendency of the products. The granular mixtures used in the laboratory caking tests were prepared from initial materials passing a 10-mesh sieve according to the formulas given in the center section of Table V. They simulate mixtures that can be prepared by preneutralization of ammoniating solution, formulas of which are given in the upper section of Table V.

The effects of potassium nitrate on the granulation characteristics of these mixtures prepared with solid materials were the same as those observed in granulating the 8-16-16, 10-10-10 and 15-10-10 mixtures.

The laboratory caking tests were conducted on 10- to 20-mesh products according to the procedure previously described. The results indicated that all of these mixtures had unsatisfactory physical condition. Even at moisture contents as low as 0.5 per cent, the sample "puddled" under a pressure of 12 p.s.i. in the caking bomb. A two per cent coating of diatomaceous earth on the granules improved their behavior in this respect but did not reduce the caking tendency to a satisfactory level as shown in the last line of Table V. The mixtures containing potassium nitrate tended to give a harder cake but only with the 16-0-16 mixture did this effect on caking appear to be significant. It seems evident that

these grades of mixed fertilizer formulated in this way would have unsatisfactory physical condition in normal commercial storage and distribution, regardless of the potash source.

## HYGROSCOPICITY

Presupposing adequate supplies and the satisfactory use of potassium nitrate in processing mixed fertilizers, a further important consideration is the relative moisture-absorbing properties of the products. Accordingly, hygroscopicity measurements were made on the eighteen mixtures discussed in the earlier sections of this paper. The method of Yee and Davis for determining the equilibrium moisture content (20) was used. The test mixtures were dried under vacuum over anhydrous for 20 hours and duplicate four-gram samples were then exposed for 72 hours to circulating air in a closed chamber, maintained at 30° C. and a relative humidity of 65 per cent. The percentage gain in weight of sample is the equilibrium moisture content of the mixture.

The gain in moisture content of the sample under these conditions is much greater than occurs under commercial conditions of packaging and storage but it is essential that a laboratory method of this kind be an accelerated test if it is to have any value in forecasting the relative hygroscopic properties of commercial fertilizers. Previous examination of some 450 commercial mixtures from various sections of the country (12) showed that the observed moisture-absorbing behavior under commercial conditions and the equilibrium moisture content as determined in the laboratory were related as follows:

FIELD OBSERVATION	LABORATORY OBSERVATION
	% Equilibrium Moisture Content at 65% R.H., 30° C.
Nonhygroscopic	Less than 20
Hygroscopic	20-30
Very hygroscopic	More than 30

With the use of these criteria for estimating the hygroscopicity of the mixtures under consideration (Table VI), the mixtures containing up to 10 units of nitrogen were nonhygroscopic, although mixture 9 is on the borderline and might give difficulty in highly humid areas. The favorable influence of potassium nitrate for decreasing the equilibrium moisture content, and hence for decreasing the hygroscopicity of these mixtures, becomes more pronounced with increasing amounts of potassium nitrate present.

The substitution of potassium nitrate for potassium chloride in the high-analysis mixtures decreased their hygroscopicities to a

considerable extent. The maximum influence is observed in the 16-0-16 mixtures 13 and 14, where the substitution of potassium nitrate for potassium chloride makes the difference between a very hygroscopic and a nonhygroscopic product. However, the severe caking tendency of mixture 14 at very low moisture contents precludes its being classed as satisfactory with respect to physical condition.

## SUMMARY

The properties of potassium nitrate are reviewed and its behavior in mixed fertilizers during processing is discussed. Its influence on the caking tendency and hygroscopicity of several mixed fertilizers is measured.

Non-granular tobacco mixtures containing up to 316 pounds of potassium nitrate per ton remained in good physical condition. High-analysis mixtures, prepared with potassium nitrate as a major source of potash, had satisfactory granulating characteristics. The granulated products containing up to 10 per cent nitrogen (grades 8-16-16 and 10-10-10), 2 per cent moisture, and 2 per cent diatomaceous earth as a coating agent, had little or no caking tendency.

Caking increased with increase in nitrogen content and tended to be somewhat greater in mixtures containing potassium nitrate than in those containing potassium chloride, but the difference became significant only in 15-10-10 and 16-0-16 mixtures.

Mixtures 16-0-16, 20-0-20, and 20-5-10, simulating some of those that can be made by preneutralization of ammoniating solution, exhibited erratic behavior in laboratory caking tests and had an unsatisfactory physical condition regardless of the source of potash used in their preparation. The hygroscopicity of high-analysis mixtures was decreased considerably by the substitution of potassium nitrate for potassium chloride in their preparation.

## ACKNOWLEDGMENT

The authors wish to express their appreciation of the cooperation extended by personnel of the du Pont Company, the Florida East Coast Fertilizer Company, the Soils Department of North Carolina State College, the Southwest Potash Company, and the Virginia-Carolina Chemical Company, during the course of this study.

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TABLE VI. Relative Hygroscopicities of Fertilizer Mixtures

Mixed fertilizer					Equilibrium Moisture content at 65% relative humidity and 30°C.	Hygroscopicity rating
No. <sup>1</sup>	Grade	Proportion of K <sub>2</sub> O from				
		KNO <sub>3</sub>	KCl	Other		
		-----Units-----			%	
1	3-9-9	none	3.00	6.25	7.1	Nonhygroscopic
2	3-9-9	3.46	3.00	2.60	7.7	Nonhygroscopic
3	3-9-9	3.46	3.00	2.61	5.9	Nonhygroscopic
4	4-8-12	none	3.00	6.00	10.2	Nonhygroscopic
5	4-8-12	7.11	3.00	2.00	9.7	Nonhygroscopic
6	4-8-12	7.11	2.61	2.42	7.5	Nonhygroscopic
7	8-16-16	none	16.02	none	14.9	Nonhygroscopic
8	8-16-16	7.52	8.49	none	10.5	Nonhygroscopic
9	10-10-10	none	10.02	none	19.9	Nonhygroscopic
10	10-10-10	7.85	2.16	none	15.6	Nonhygroscopic
11	15-10-10	none	10.02	none	42.2	Very hygroscopic
12	15-10-10	7.85	2.16	none	25.4	Hygroscopic
13	16-0-16	none	16.02	none	41.1	Very hygroscopic
14	16-0-16	16.02	none	none	11.6	Nonhygroscopic
15	20-0-20	14.10	5.91	none	29.8	Hygroscopic
16	20-0-20	20.02	none	none	26.7	Hygroscopic
17	20-5-10	none	10.02	none	61.9	Very hygroscopic
18	20-5-10	10.01	none	none	40.8	Very hygroscopic

<sup>1</sup> Mixtures 1 to 6 were nongranular; 7 to 18, were granulated.



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Potatoes	Flea beetle, Colorado potato beetle, leafhoppers, aphids, southern armyworm, green stink bug, potato tuberworm, leaf-footed plant bug	Up to harvest
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How to produce farm chemicals is not our big problem, but rather, the intricate methods of how to sell them at a maximum profit. You have probably heard of our Farm Chemicals Marketing Seminar—and how helpful it has been to all who attended. We have some extra copies of the 1959 proceedings which we feel we should make available to our readers. Should you want a copy, covering over 180 pages, write to Farm Chemicals, 37841 Euclid Avenue, Willoughby, Ohio. The books cost \$4.00 apiece.

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This is the title of a booklet which you can read in 30 minutes, and it is the best thing I've seen on the agricultural market. The fast changing complexion of this market demands that we keep up-to-date. Here you'll find, in simple straightforward language, where the farm market is, how big it is, and what's going to happen to it in the years ahead. This is information you should have. Should you like a copy of the booklet, just

CIRCLE 64 ON SERVICE CARD

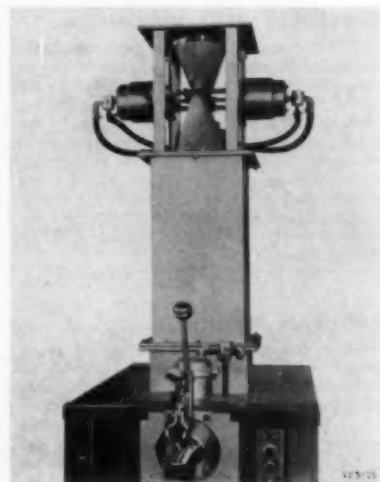
### ACCURATE AND IMPORTANT

Perhaps you have had a faulty gauge in your manufacturing process. The result is costly and time-consuming. A new brochure from United States Gauge, Division of American Machine and Metals, Inc., describes a complete line of dial indicating receiver gauges used to indicate values transmitted by pneumatic signal from a remote location, usually in the range of 3 to 15 psi. The eight-page folder gives complete specifications for both the bourdon tube and diaphragm-actuated types. Copies of the catalog are available simply by

CIRCLING 65 ON SERVICE CARD

### PACK WITH AIR PRESSURE

Many fertilizer and chemical companies have reached a bottleneck in their bag filling operations because the chemical to be packed does not flow easily. A new air-push hopper, designed as an accessory to the Coddington Air-Pac Valve-Bag Packer, solves this problem effectively. Continuous air pressure is maintained in a new hopper chamber directly below the feeder bins. When the air push hopper is filled with material, the valve at the top of the chamber closes automatically. At the same time, compressed air is injected into the material and the valve to the filling spout is opened. The material is then forced into the bag. When the correct weight is in the bag, the scale shuts off



the flow of material by closing the filling spout valve. The valve at the top opens and the filling hopper is loaded with more material. This air-push hopper from E. D. Coddington Mfg. Co., is quick, efficient, and positive. You can get full details by

CIRCLING 66 ON SERVICE CARD

**FARM CHEMICALS**



## Suppliers Briefs



Walker

**Agricultural Business Co.,** Lawrence, Kan., has appointed C. B. Walker, Des Moines, Iowa, as sales representative for its new line of equipment for the fertilizer industry. Walker will represent the company on the new balanced liquid fertilizer plant, Agri-Blend dry fertilizer blending plant, and a complete line of liquid fertilizer and dry fertilizer application equipment to complement these lines.

**Bemis Bro. Bag Company** has acquired a substantial interest in The Systemation Corp., a St. Louis area firm which specializes in development of integrated and automated packaging systems and machinery, according to F. G. Bemis, Jr., director of allied operations.

**Chase Bag Co.** George K. Whyte has been appointed to the new position of central regional sales director. The former St. Louis sales division manager will now be responsible for the Toledo, Cleveland, Detroit, Buffalo and Pittsburgh sales areas, with headquarters in Toledo.



Whyte

**James G. Jackson**, previously sales manager for Chase in St. Louis, succeeds White as manager of the St. Louis sales division.

**Gandy Co.** Michael C. Chavez will represent the firm in their Eastern States Div., working from headquarters at New Cumberland, Pa.

**International Paper Co.** O. B. Beyer, manager for the last 25 years of International's mill at Corinth, New York, retired December 31. Judson Hannigan, Jr., replaces him as manager.

**Joy Mfg. Co.** Robert F. Stewart has been elected a vice president of Joy and general manager of the Western Precipitation Div. He has been assistant general manager of the division for the past year.

**Sturtevant Mill Co.** officials report that advancements made by the firm in 1960 in the fields of grinding, classifying, milling and blending "will be fortified in 1961" by "newer and even more improved classifying and reduction equipment," some of which is now on the drawing board, other equipment in actual field operations.

## MANUFACTURERS OF SODIUM ARSENITE SOLUTIONS

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### — OPPORTUNITIES —

Field Research positions available in a progressive and expanding program in the development of agricultural chemicals. PhD or equivalent plus experience in Animal Husbandry and/or Entomology desired. Must have interest in and have worked with livestock. Positions will require energetic participation and prime responsibility of research program coordination within a Northwestern or North Central area. Opportunity for advancement considered excellent. Send details of education and experience too:

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## NEWS OF THE INDUSTRY

### SPENCER CHEMICAL HOLDS SALES WORKSHOPS



David White, Warren Lowe and Harold Bass, Morristown, Ind., and Jere Wise, Spencer Chemical Co., are shown at a Spencer sales workshop.

Audio-visual sales techniques were stressed recently at two sales workshops held for midwestern anhydrous ammonia dealers in Henderson, Ky., and Omaha, Neb. The two-day workshops, sponsored by Spencer Chemical Co., attracted more than 100 dealers.

Included in the sessions were discussions of selling techniques, information on the effective use of anhydrous ammonia and presentation of a new film-strip "Look Down to See Higher Profits" which Spencer has produced for dealer use.

### PCA WASHINGTON OFFICE MOVES BACK TO NYC

On February 1, Potash Company of America moves its general sales office from Washington, D. C. to New York City. The office is located in Suite 1718, 630 Fifth Avenue, New York City 20; telephone number is LT 1-1240.



Mell

PCA has named J. Robert Mell assistant general sales manager, responsible for sales in the southern half of the country. Frank H. Kennedy becomes assistant general sales manager, responsible for sales in the north-



Kennedy



Lenhart



Smith

ern half of the country.

Robert B. Lenhart becomes midwestern sales manager, the position formerly held by Kennedy, and is operating out of the Peoria office.

F. Edward Smith, Jr., takes over the northeastern sales territory, continuing to reside in the Baltimore-Washington area.

### NEW CONSULTING SERVICE

Formation of a new consulting service, Agricultural Marketing Services, in Glenview, Ill., has been announced by

Dr. Roger W. Roth, senior consultant. Assistance is offered farm chemicals manufacturers in a variety of areas including acquisition searches, market surveys, product planning, evaluation and introduction of new products, promotion and merchandising, personnel and public relations.

### BLOCK SUCCUMBS

Edward Block, 58, senior vice president and general manager of the Chemicals Division, Olin Mathieson Chemical Corp., died at 5 a.m., Jan. 4 in Johns Hopkins Hospital, Baltimore.

### TANK NEARS COMPLETION



High above USI—National Distillers' Tuscola, Ill., chemical complex, a welder joins plates in the outer wall of a new ammonia storage tank-inside-a-tank. The 2½-foot space in which the welder is working will be filled with insulation so that ammonia in the inner tank can be maintained at -28° F. The inner tank, 88' in diameter and 56' high, will have a capacity of 7,000 tons of ammonia.

### MONSANTO COMPLETES ANNISTON EXPANSION

Completion of a 50 per cent expansion of its Anniston, Ala., plant for manufacturing parathion and methyl parathion insecticides is reported by Monsanto Chemical Co. The facility has an annual capacity of 18 million pounds.

### NEW UREA PROCESS FROM CHEMICO

Perfection of a new, lower cost, more efficient process for the production of urea has been announced by Chemical Construction Corp.

The process employs the principle of carbamate solution re-cycle, reported to facilitate the complete consumption of the ammonia and carbon dioxide used as raw materials.

Chemico said the process has a unique method of conserving the heat that results from its operation, and

significantly less steam is required than by other methods.

The process already has had its first practical commercial acceptance by the Cooperative Farm Chemicals Association, Lawrence, Kansas, Chemico stated.

### HEPTACHLOR PROGRAM THEME: "MORE PROTECTION PER POUND"

Highlighting the 1961 soil insect sales promotional campaign for the midwest is the theme "More protection per pound," according to Velsicol Chemical Corp. This year's campaign is reported to be the strongest Heptachlor midwest soil insect program to date, and the largest program supporting the pesticide trade ever conducted by Velsicol.

The program includes billboard coverage; ads in state and regional farm publications; radio and TV spots; ads in local newspapers; plus related literature, posters, streamers and pamphlets for use at the point of sale.

### U.S. PHOSPHORIC ISSUED PATENT FOR MANUFACTURING DI-MON

U. S. 2,963,359 issued December 6, 1960, to G. F. Moore and Thomas Beer, assigned to Tennessee Corporation, describes a process for producing a granular modified diammonium phosphate, 18-46-0, marketed under the trade name DI-MON.

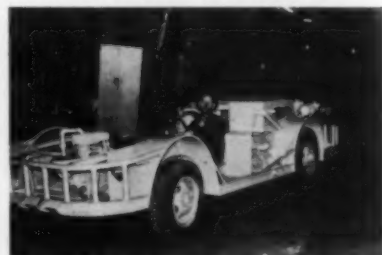
The patent covers a process which is unique in that the reaction and granulation are accomplished in an unusually simple process flow.

This process flow is well adapted to positive control, which yields a product of excellent physical and chemical uniformity.

### NPFI BOOK SALE

The National Plant Food Institute now is offering "Hunger Signs in Crops" at \$1.50 a copy, and "The Care and Feeding of Garden Plants" at \$1.00 a copy, postpaid, to domestic addresses. Address the Institute at 1700 K Street, N.W., Washington 6, D. C.

### NEW IDEA IN CAR DESIGN



While automakers debate the merits of front- and rear-engine cars, International Min. & Chem. Corp. has built a car with the engine right in the middle. But it will never see the light of day. Only 48 inches high, it's a service car that works 900 feet underground in IMC's potash mine at Carlsbad, getting lubricating materials and equipment to all corners of the mine.

## People

**American Potash & Chemical Corp.** Earle M. Jorgensen, president and chairman of Earle M. Jorgensen Co., Los Angeles, has been elected to the board of directors of American Potash.

**Armour Agricultural Chemical Co.** has named C. M. Einhorn as new products development manager and Guilford S. Barteaux as specialty sales manager. Einhorn had been specialty products manager at Atlanta and Barteaux, specialty sales supervisor for the Carteret, N. J., Division.

**Bradley & Baker.** H. Clair Dyer recently joined B&B's St. Louis office as a fertilizer sales representative. Dyer, who has served the fertilizer industry in the Midwest for many years, will reside in Peoria, Ill., covering fertilizer manufacturers in that state.



Dyer

**California Chemical Co., Ortho Div.** M. E. Wierenga, vice president and marketing manager, recently announced appointment of a national fertilizer group. The group, formerly concerned with the company's western operations only, consists of William E. Jaqua, national manager, fertilizer sales; L. R. Hamilton, assistant national manager, fertilizer sales; and Dr. M. H. McVicar, chief agronomist.

According to Wierenga, the move is directly connected with the Ortho entry into the fertilizer marketing area of the northern United States. The new \$22 million fertilizer facility being built in Fort Madison, Iowa, is scheduled for completion late this year.

**Cooperative G.L.F. Exchange Soil Building Division.** John C. Crissey retired in December as head of the division, a post he has held since 1942.

**Dow Chemical Co.** Hilard L. Smith has been named assistant to the manager of agricultural chemical sales, W. W. Allen has announced. In the new position Smith will handle administrative, personnel and sales development functions.



Smith

**Eastman Chemical Products, Inc.** Robert H. Cannon, Jr., has been appointed to the new post of assistant sales manager in charge of field sales. Most recently, Cannon was eastern regional sales manager, located at Lodi, N. J. In



Cannon



Taylor

his new post he will be located at Kingsport, Tenn.

George J. Taylor, former district sales manager at Philadelphia, becomes eastern regional sales manager. He will continue to make Philadelphia his headquarters.

**Geigy Agricultural Chemicals, Div.**

of Geigy Chemical Corp. has appointed Douglas Knapp to its field representative staff. He will represent Geigy in southern Florida. Knapp had been assistant county agent, Dade County, Fla.



Knapp

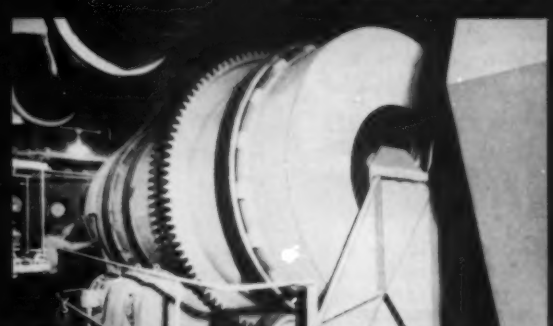


Calhoun

Leo K. Calhoun has joined Geigy Agricultural Chemicals' Alabama sales staff.

# FOR THE FERTILIZER INDUSTRY


**AMMONIATORS\*  
COOLERS  
DRYERS  
ELEVATORS\*  
GRANULATORS\*  
CONVEYORS**



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7'6" dia. x 15' heavy duty Continuous Combination Ammoniator-Granulator — With 40 HP motor and Renneburg exclusive motorized cam-actuated knockers. Unit handles 70 tons per hour granular fertilizer throughput.



24-million BTU/Hr capacity Renneburg Refractoryless Furnace used with 8' dia. x 60' Dryer (left), parallel with 8' x 60' Counter-Current Cooler.

Renneburg Rotary Drying Unit (behind Counter-Current Cooler in foreground) — Equipped with 5-compartment insulated cloth-type collectors, having orlon dust tube filters for effective air pollution control.



Literature and information on request.

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## NEWS OF THE INDUSTRY

**International Minerals & Chemical Corp.** Two promotions in the Materials Dept., Agricultural Chemicals Div.:

Gerd W. Kraemer, regional sales manager in Minneapolis, moves up to a new post, assistant sales manager, Materials Dept. He will move to Skokie and report to E. C. Horne, sales manager. Alexander McBride succeeds Kraemer as regional sales manager in Minneapolis.

**Monsanto Chemical Co.** has relocated two members of the field sales staff of its Agricultural Chemicals Div. Darwin Holland, sales representative at Jackson, Miss., transfers to Columbus, Ohio, to service the Cincinnati district. Calborne L. Barber, assistant sales manager for the New Orleans district, moves to Jackson, adding to his responsibility those accounts previously handled by Holland.

**National Distillers and Chemical Corp.** Raymond R. Herrman, Jr., has been elected a vice president.

**Niagara Chemical Div., Food Machinery and Chemical Corp.** J. R. Jones has been appointed production coordinator for Niagara's 20 plants in the U. S., Canada and Mexico. H. G. Beierl succeeds him as manager of the division's plant at Middleport, New York.

**Nitrogen Div., Allied Chemical Corp.** Elmer Perrine has been named director of technical service.

**Pennsalt Chemicals Corp.** reports appointment of Dawes Walter as manager of advertising and public relations and Richard S. Lee, assistant advertising manager.

Before joining Pennsalt, Walter was with Atlantic Refining Co. Lee moves to his new assignment from the post of sales promotion manager, Industrial Chemicals Div.

**F. S. Royster Guano Co.** has named Ronald S. Buhr sales representative in northeastern Iowa. He will work out of Royster's Madison, Wis., sales office.

**E. Rauh & Sons Fertilizer Co.** Simon J. Martenet, president since January 1938, died December 11 in Indianapolis. Martenet was founder of the Marion Mfg. Corp. and a director of the Indianapolis Union Railroad and Indianapolis Stock Yards Co.

**Smith-Douglass Co., Inc.** New manager of the Texas City, Tex., operation is James F. Roe, formerly with International Minerals and Chemical Corp. Herman G. Powers, who has been manager of the Texas City plant, transfers

to the company's home office in Norfolk, Va., to become assistant to the production manager, Fertilizer Div.

**Stauffer Chemical Co.** Wyman L. Taylor becomes eastern sales manager, Industrial Chemicals Div. Previously he was administrative assistant to the vice-president, sales.

**SunOlin Chemical Co.** has named Norton H. Walton assistant operating superintendent in charge of the urea plant at Claymont, Del. Before joining SunOlin, Walton was with Atlantic Refining Co. for 27 years, most recently as supervisor in the chemicals section.

**Tennessee Corp.** has appointed J. T. Parkerson, Jr., as assistant general manager of the East Point Div. Parkerson has been with the Atlanta sales office for several years in sales and technical service.

Concurrently, the firm congratulated W. A. Jackson, sales manager, who retired after 31 years of service.

**Texaco Inc.** Theodore A. Mangelsdorf, senior vice president, has announced appointment of Robert R. Chase as assistant to the senior vice president.



Stephens

**Texas Gulf Sulphur Co.** Claude O. Stephens, president, has been named chief executive officer, succeeding in the latter capacity Fred M. Nelson, who has retired as chairman.

Stephens has been president since March 1957. His entire career has been with Texas Gulf. He joined the firm in 1932 after graduation from Louisiana State University.

**United States Rubber Co.** Leonard R. Fertig and Raymond J. Mucci have been appointed assistants to the president, reports President George R. Vila. Fertig will coordinate management engineering activities and cost reduction programs and Mucci, administrative functions of the president's office and special assignments.

## Associations Meetings

### WOODBURY NAMED PRESIDENT OF NEW MIDWEST GROUP

Newly organized Midwest Agricultural Chemicals Association has elected Herbert Woodbury, Woodbury Chemical Co., as its president.

Established at a meeting in Kansas City, Mo. in December, the group is comprised of agricultural chemical manufacturers, formulators and distributors engaged in the sale of basic agricultural chemicals in the states of Iowa, Nebraska, Missouri and Kansas.

MACA officers serving with Woodbury are: Vice president—Douglas Nelson, Niagara Chemical Div., Food Machinery and Chemical Corp.; secretary—Harold Howard, Thompson-Hayward Co. Directors are: Robert Brown, Miller Chemical Co.; Douglas Nelson, Niagara Chemical Co.; Ray Northrop, Associated Chemical Co.; and Woodbury and Howard.

Next meeting of MACA has been set for Friday, March 3, in Omaha, Neb.

### CSMA NAMES OFFICERS

Charles E. Beach, John C. Stalford & Sons, Inc., Baltimore, was elected president of the Chemical Specialties Manufacturers Association at the association's 47th annual meeting at the Hollywood Beach Hotel, Hollywood, Fla., Dec. 5-8.

Charles E. Allerdice, Jr., of The Bell Co., was named first vice-president; Donald J. Templeton of Stanley Home Products, Inc., second vice-president; Frederick G. Lodes of Lodes Aerosol Consultants, treasurer, and Alfred A. Mulliken, CSMA, secretary.

Elected to the board of governors for three-year terms were George W. Fiero, Esso Standard Div., Humble Oil & Refining Co.; John A. Rodda, Fairfield Chemicals Div., Food Machinery & Chemical Corp., and Joseph J. Tomlinson, General Chemical Div., Allied Chemical Corp.

## Calendar

**Feb. 2.** Chemical Buyers Group of National Association of Purchasing Agents, mid-winter conference, Commodore Hotel, New York City.

**Feb. 6-8.** Association of Southern Agricultural Workers, Agronomy Section, 58th annual meeting, Heidelberg Hotel, Jackson, Miss.

**Feb. 14-15.** Aquatic Weed Control Society, second annual meeting, LaSalle Hotel, Chicago, Ill.

**Feb. 16-17.** Midwestern Agronomists and Fertilizer Industry Representatives,

annual conference, Edgewater Beach Hotel, Chicago, Ill.

**Mar. 2.** Drug, Chemical and Allied Trades Association, annual banquet, Waldorf-Astoria Hotel, New York City.

**Mar. 3.** Midwest Agricultural Chemicals Association, meeting, Omaha, Neb.

**Mar. 13-15.** Western Agricultural Chemicals Association, spring meeting, Disneyland Hotel, Anaheim, Calif.

**Mar. 21-30.** American Chemical Society, national meeting, St. Louis, Mo.



## FOR SALE

- 1—Worthington 70 cu. ft. rot. batch blender.
- 1—Raymond 66" 5-roll mill, rebuilt.
- 2—Raymond 50" 5-roll hi-side mills.
- 2—National 10' x 78" rotary dryers.
- 2—Davenport 8' x 60' rot. dryers, 7/16" welded.
- 1—7'-6" x 62' rotary cooler, 1/2" welded.
- 2—Bonnet 7' x 60' rot. dryers, 5/8" shell.
- 2—Bonnet 6' x 52' rotary dryers.
- 1—Louisville 6' x 50' steam-tube dryer.
- 1—Louisville 5' x 25' steam-tube dryer.
- 1—Louisville 4'-6" x 25' steam-tube dryer.
- 1—Standard 3' x 25' rotary dryer.
- 2—18,000 gal. vert. alum. tanks.

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ROTARY DRYERS & COOLERS  
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Field Research position available in a progressive and expanding program in the development of agricultural chemicals. PhD or equivalent plus experience in Entomology and/or Plant Pathology desired. Position will require energetic participation and prime responsibility of research program coordination within an East Coast area. Opportunity for advancement considered excellent. Send details of education and experience to:

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**LIQUIDATING** alcohol mfg. & grain processing plant at Omaha, Neb. Stills, dryers, filters, presses roller & hammermills, pumps, etc. Send for circular. Perry, 1430 N. 6th St., Phila. 22, Pa.

## Chemicals

### SPENCER REPORTS ON FARM TEST PROGRAM

Spencer Chemical Co. reports that Carbyne herbicide did an effective job of post-emergence wild oat control in farm tests on 16,000 acres of cropland in the United States.

Harvest results indicate that over-all average yield increase in the U. S. from Carbyne versus untreated crops was: Spring wheat—8.8 bushels per acre; Durum—9.3 bushels per acre; Barley—9.1 bushels per acre.

Cooperating with Spencer in its program of supervised application this summer were F. H. Peavey and Co., AGSCO, Inc., Selco Supply Co., Montana Flour Mills, Inc., Miller Products Co. and Chipman Chemical Co.

### MICROBIAL INSECTICIDE FROM ROHM & HAAS COMPANY

Availability of Bakthane L-69-insecticide wettable powder and dust concentrate based on the micro-organism *Bacillus thuringiensis* Berliner has been announced by Rohm & Haas Co.

Bakthane L-69 contains 75 billion spores of *Bacillus thuringiensis* per gram. It may be applied as a wettable powder, generally at 1 to 2 pounds per acre. It also may be formulated into dusts. Dust usage is based on an active ingredient content of at least 5 billion to 7.5 billion spores per gram (6.7 per cent to 10 per cent dilution of the concentrate in inert carriers).

### NEW USE FOR ETHION

Citrus growers can now use ethion as a defense against mites and scale for the first time. Stuart Bear, manager of Niagara Chemical Div., Food Machinery and Chemical Corp., reports that residue tolerances have been granted and use recommendations registered for this pesticide on oranges and grapefruit.

According to new USDA registrations, ethion may be applied to oranges and grapefruit in Florida and Texas as a mite control and in California to curb both scale and mites. For these applications, FDA will allow 1 ppm tolerance for residues of the material. A tolerance of 5 ppm is permitted in dried citrus pulp used for cattle feed.

### ILLINOIS 6-MONTH FERTILIZER SALES SECOND LARGEST

Total plant food sales in Illinois for the first six months of 1960 were the second largest ever reported for any six-month period. But sales were almost 10 per cent under the record-breaking first six months of 1959. Wet weather played havoc with truck spreading and meant a lower tonnage of bulk-applied fertilizer this spring.

## CENTURY SELF-PROPELLED SPRAYERS



Sprayer rental is a profitable service offered by many fertilizer and ag chemical dealers. Whether you charge equipment rental by the hour or by the acre, you profit both from the sale of material and the equipment rental fee.

CENTURY'S self-propelled sprayer gets the job done accurately and without trouble because it is engineered for just such rugged performance. Nylon nozzles handle all chemicals, even liquid fertilizers. So does the 150 gal. fiberglass tank. It works equally well in low or high crops. An inexpensive trailer transports it easily at highway speeds. Find out how CENTURY can help you sell more chemicals and liquid fertilizer by offering sprayer rentals to farmers in your area. Write today for free 20-page information booklet to: CENTURY ENGINEERING CORPORATION, CEDAR RAPIDS, IOWA. Dept. 154C

## ORDER NOW! 1961 SPRAY COMPATIBILITY CHART



Larger and completely revised for 1961. This chart tells at a glance just what chemicals mix safely.

**50c**

Don't forget our important Companion Spray Safety Chart.

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Order both charts  
— a \$1.00 value — for only 75c.  
Quantity prices on request.

This offer good only in U. S. A. and Canada. Coin or money order must accompany each order.

### FARM CHEMICALS Willoughby, Ohio

Enclosed is money or my check. Send . . . . compatibility charts and/or . . . . companion spray safety charts to:

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City . . . . . State . . . . .

## MONARCH SPRAYS



This is our Fig. 645 Nozzle. Used for Scrubbing Acid Phosphate Gases. Made for "full" or "hollow" cone in brass and "Everdur." We also make "Non-Clog" Nozzles in Brass and Steel, and Stoneware Chamber Sprays now used by nearly all chamber spray sulphuric acid plants.  
CATALOG I

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Specialty: Analysis of Fertilizer Materials and Phosphate Rock. Official Chemists for the Phosphate Industry. Official Weigher and Sampler for the National Cottonseed Products Association at Savannah; also Official Chemists for National Cottonseed Products Association.

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## FARM CHEMICALS HANDBOOK

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distribution of nitrogen solu-  
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Precision built for uniform  
spray distribution and exact  
volume control. Over 400  
interchangeable orifice tips  
for all spray patterns and  
chemicals.

### RELATED EQUIPMENT FOR BOOM AND HAND SPRAYERS



Most components supplied in  
choice of brass, aluminum,  
stainless steel and  
Nylon for all spraying  
needs.

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# FLEX-A-FOAM DUST MASKS

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worker alike could  
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dust respirator!



1. **Form-fitting design:** Self-adjusting to any size and shape of face without pressure or irritating discomfort.
2. **Attractive styling:** Smartly designed to suit the most discriminating wearer.
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4. **Easy-breathing comfort:** Easier to breathe through and talk through than an ordinary pocket handkerchief.

5. **Feather-like weight:** Weighs only 1 ounce complete.
6. **Simplicity and economy:** Only 4 tough, long-wearing, inter-locking parts — all washable. Pure latex filter outwears throw-away type more than 100 to 1.

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DUST MASK  
**FLEXO PRODUCTS, INC.**  
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Sample only \$1.45 postpaid  
(Industrial price only)

**Without getting too involved** in semantics, we think it's time we asked: "Who is the marketing manager?"

Those little boxes that make up the company organization chart aren't important. It's *who's in them* that counts.

In our first FCMS in 1959, it was Charles E. St. Thomas, St. Thomas Associates, who said:

"Top management must recognize the need to allocate the necessary time to the *knowledgeable* people who can make decisions correctly, for these decisions tend to become irrevocable. They must be made thoughtfully and knowledgeably with the advice and counsel of those from inside and outside the company."

*Who is the marketing manager?*

He's a man who has a rational approach to production and sales. His business is *profits*. He possesses no strong biases whatsoever. He applies *skilled evaluation* to every problem. He knows what the *overall* situation is at all times. He is capable of saying "no"—and meaning "no"—if the answer is "no." And "yes" if the answer must be "yes"—from the overall company point of view. At all times he must side with the *marketing* side—not the sales, or some other side!

These are some of "Stu" Bear's words. The manager of Niagara Chemical Division, Food and Chemical Corporation, made quite a hit at last November's FCMS—in answering pointed questions about his company's reorganization in January 1958, when 12 "profit centers" were set up.

This question was asked of Stu:

"Does the main manufacturing plant at Middleport report to marketing along with the field manufacturing plants?"

Stu's answer—followed by a rapid succession of questions, to which a lesser man would have pleaded the "fifth amendment" was:

"Every manufacturing plant that we have reports to the *manager in charge of marketing* for the area in which the plant is located—even though a number of the plants produce goods for use in all other segments and components of the company."

Q. "Your regional marketing director is the *regional manager*?"

A. "Right."

Q. "Regardless of what products are made?"

A. "Right."

We don't want you to miss Stu's complete report of Niagara's policy formulation this month. His frank, honest remarks about Niagara's reorganization will prompt many a skeptic to take a hard, cold look at the total marketing concept.

*A friend of the writer's* once started his talk with the following description of management succession:

"The president retires or dies and creates a vacuum into which is swept the nearest vice president who hasn't had a coronary."

## Who is the marketing manager?

About as little thought is many times given the filling of a marketing manager's post.

*Who is the marketing manager?*

Many times the marketing manager is a former sales manager—a man who spent a lifetime or less in a secondary set-up—in a particular line. Dr. Henry Bund, Research Institute of America, says that this doesn't always work, because the former sales manager finds it difficult, if not impossible, to modify his *thinking*, his *terminology*, his ideas about research and so on.

Some of us, on the other hand, probably could cite cases where the job *should* have gone to the sales manager but *didn't*.

As an example of the latter case, Dr. Bund described the following situation:

"When one of my associates visited a company executive who at the time had the title of vice president in charge of sales—he seemed to have a good *marketing* operation. It filled all the requirements which you or I might stipulate for a successful marketing system."

So what happened? Management apparently had heard about the "marketing concept" and said "that's for us." So without even realizing that they possessed an effective marketing manager, they brought someone in and put him *over* the sales manager.

"So let's not play around with words," warned Bund. "It's what *gets done* and *how* it gets done that really matters."

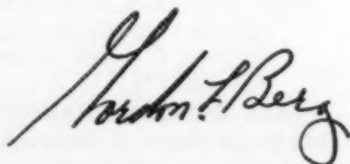
**Some people** still avoid reference to the marketing concept term as they would a plague. This question was asked of Dr. Bund:

"Why do companies both large and small fight the marketing concept, despite its proven benefits? Is the reason largely because many executives have vested interests in status quo by *virtue of the fact that they are not really qualified for the jobs*?"

Dr. Bund: "Yes, I think that is part of the reason that they occur in departments other than sales. On the other hand, we in marketing have become, to an extent, guilty of exaggerating and feeding those fears!

"We go ahead and infer that the marketing function is so broad that there is no distinction between it and the *president's* function!"

In passing, we're getting a lot more discussion on the marketing concept these days than a couple years ago, when the subject sometimes crept into a sales discussion. Much of it continues to fall under the general category of lip service, but it's still good, healthy discussion.





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